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HEARING

BEFORE THE

COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE

OF THE

HOUSE OF REPRESENTATIVES

ON

H. R. 7264

AND OTHER BILLS PROVIDING FOR LIGHT-HOUSES, LIGHT-SHIPS, AND FOG SIGNALS TO BE LOCATED AT VARIOUS POINTS.

WASHINGTON:
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1904.

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LIGHT-HOUSES, LIGHT-SHIPS, AND FOG SIGNALS.

COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE,
Friday, January 22, 1904.

The committee met at 10.30 o'clock a. m., Hon. William P. Hepburn in the chair.

The CHAIRMAN. There are 19 bills which have been referred to this committee that relate to light-houses or the light-house service, and I have invited the members of the Light-House Board to appear here, as directed by the committee, to advise with regard to those matters. There is one bill that is especially important in view of the number of gentlemen present here that take an interest in it, and that is the Diamond Shoal light-house, as proposed in House bill No. 7264 and Senate bill No. 2319. I have not examined them to see whether they are identical.

STATEMENT OF HON. J. H. SMALL.

Mr. ADAMSON. Mr. Small, is your bill the Senate bill or the substitute bill which was reported by this committee?

Mr. SMALL. The bill that was reported by your committee.

This bill was before the committee at the last session, and the committee after consideration reported a bill which is the same as the bill introduced by me and referred to this committee at this time.

The object of this bill is to authorize Capt. Albert F. Eells and his associates to construct a light-house on Diamond Shoal, at Cape Hatteras, on the coast of North Carolina. The point at which it is proposed to erect this light-house is at the outer Diamond Shoal, which is about 8½ miles from the mainland. This point is under water and it is proposed to construct the light-house in 30 feet of water. I need not say that this is the most dangerous point on the entire Atlantic coast, and if it can be marked and be a permanent and substantial aid to navigation any amount of money within reason which the Government should expend for the purpose would be justified.

An effort was made in 1885 or 1887—I forget the exact date—by the Light-House Board, under an appropriation of $500,000 by Congress, to construct a light-house at this point. Plans were made which, so far as I know, were entirely feasible from an engineering standpoint. They were prepared by the Light-House Board and the contract was made with Anderson & Barr, of Pittsburg, and it is sufficient to say that they attempted to put the light-house there and to construct the caisson, but a storm came up during the construction and carried it away. Since that time no effort has been made by the Light-House Board to construct a permanent light station at this point. There has

been maintained for several years a light-ship about 6 or 7 miles farther out. The light-ship answers, of course, a very useful purpose, and I understand it is the opinion of the Light-House Board that in any event this light-ship should be maintained there. However, the fact is that this light-ship has been driven away from her moorings upon several occasions during storms and at times when this aid to navigation was most needed, and while the Light-House Board is hopeful of being able to secure this light-ship in the future in a more stable fashion, yet the storms there are of such force and duration that it may well be doubted whether they will ever be able to maintain a light-ship there which will ride out the severe storms which they have at intervals.

As to this particular bill, it proposes to authorize Captain Eells and his associates to construct this light-house. He says that he can do it, and he says that in order to demonstrate his ability to do it he is willing to construct it and to wait for his money. The bill that has been passed by the Senate provides that he shall be paid one-half in one year and the balance in two years. The bill as reported by this committee at the last session provided that he shall construct and maintain the light-house at his own expense for twelve months after construction, and that then for four years it shall be maintained at the expense of the Light-House Board, and then at the end of five years, if the Chief of Engineers of the Army shall certify that the structure is in a substantial condition and is a permanent structure and suitable for the purpose, he shall be paid the sum of $590,000. The $90,000, under the calculation that was made by the committee at the last session, was to compensate for interest at 4 per cent upon $500,000, and to some extent, at least, compensate for the maintenance of the light-house for twelve months after it should be constructed.

I will not go into the details of the bill in regard to the specifications it gives as to the manner of construction. I can only say that this matter was gone into carefully at the last session and many amendments were made in these particulars, and, without meaning to single out any gentleman of the committee, I may say that the chairman gave very considerable attention to that feature of the bill. We believe if the bill should be subject to any criticism upon the ground that it does not give sufficient specification in order to enable an engineer to pass an intelligent judgment upon the character and permanency of the structure that the fact that the structure is not to be paid for until it shall have remained five years is sufficient in itself to guarantee fully the protection of the Government.

The CHAIRMAN. Will you give us briefly the character of this proposed improvement?

Mr. SMALL. It is to be sunken into the ground under water first in depth of water not less than 30 feet, and the caisson is to be sunken not less than 15 feet or a sufficient depth in order to obtain a secure foundation. That is to be filled in with masonry and concrete up to a point at least 20 feet above the mean water. That is to be solid masonry, except that there shall be sufficient space in it to contain a storage of fresh water and supplies in part for the light-house. Above this goes the tubular steel structure. I failed to state that the bottom of this caisson is to be 70 feet in diameter and is to be bell-shaped and to go up, gradually decreasing in diameter, so that at 30 feet above the top of the water it is 27 feet in diameter. From that point, 20 feet, is

erected a circular steel structure, and that goes up 20 feet farther, and it is to be 25 feet in diameter at the top. On the top of that is to be constructed another tubular steel structure of sufficient diameter to contain a spiral stairway in order to reach the top, and the light is to be upon the top, not less than 200 feet over mean low water. The lens is to be furnished by the Light-House Board and constructed under their direction.

Captain Eells proposes to make this structure permanent and substantial, and, as an evidence of his faith that it will be able to withstand the occasional tropical storms that come along Cape Hatteras, he says he is willing to wait five years for his money. I may say that a communication was obtained last year from the Weather Bureau, who keep a record of the storms, to the effect that these severe storms occur usually every two years, but certainly on an average of every three years. So, during the five years we would surely have one and perhaps more of these severe storms.

The winds there reach a velocity of 90 and 95 miles an hour, and sometimes 100 miles an hour.

Mr. STEVENS. How high do the waves run during those tropical storms?

Mr. SMALL. I would not attempt to state, but I can answer that they are very high. Perhaps some of these gentlemen can answer that question.

Captain SILVA. I would say that Hatteras is in a peculiar situation, between tropical storms and the north Atlantic storms, and I believe that more heavy and more dangerous storms occur there in the shoal water than on any other part of the Atlantic coast. As to the height of the waves, it would be hard to say what it might be, as storms vary very much, but it would seem many times that the light would be made obscure by the spray but never by the sea itself.

Mr. STEVENS. I was thinking about the top of this caisson and the steel structure in reference to that.

Captain SILVA. The top of the sea is always the worst and therefore the stronger part of this structure would be the base, and it would have the least resistance of any part of the structure.

Mr. RICHARDSON. Have you explained to the committee that an effort has been made heretofore to establish a light-house at this point and that it was a failure?

Mr. SMALL. Yes, sir.

Mr. RICHARDSON. And that under this bill there is to be no charge made against the Government until the Government has experimented with the light-house for one year?

Mr. SMALL. Yes, sir.

Mr. BURKE. How much money did the Government spend in attempting to construct that light-house?

Mr. SMALL. I do not know. I am not sure whether under the contract the Government spent anything or not.

Mr. BURKE. Do I understand you to say that this light-ship that is maintained there is at a point some 6 or 8 miles further out?

Mr. SMALL. Yes, sir.

Mr. BURKE. Would the light-ship necessarily be continued there if this light-house was constructed?

Mr. SMALL. I had supposed not, but I am informed that in the opinion of the Light-House Board, even if this structure was placed there,

they would think it best to continue the light-ship. They do not oppose the construction of the light-house but think it necessary. There was a communication from the Light-House Board at the last session which, as I understand, has also been substantially restated at this session, to the effect that they regard the construction of a light-house there as feasible, but think there should be a breakwater or shore station, for which they estimate a total cost of $1,500,000.

STATEMENT OF CAPT. J. ED. O'BRIEN.

The CHAIRMAN. Are you connected with the pilot association?

Captain O'BRIEN. Yes, sir.

The CHAIRMAN. In what way?

Captain O'BRIEN. I am connected with the masters and pilots of steam vessels, as a member, and I am president of the National Bar Pilot Association, and I wish to state in the latter capacity that I represent a body of men who are all deep-sea men. In the former organization, I represent 10,000 masters and pilots of steam vessels, constituting all men who guide the ships on the Great Lakes, on the Pacific, on the Atlantic, and on the Gulf, and I know that I voice their sentiments when I ask this committee to push this bill as early as possible.

At a meeting of the representatives of the American Association of Masters and Pilots of steam vessels I brought this matter before them, and after due deliberation I offered a resolution and I believe that every mariner in that room seconded the motion for its adoption and it was adopted unanimously by a rising vote.

The CHAIRMAN. What was that resolution?

Captain O'BRIEN. The resolution would have been here, Mr. Chairman, but the wife of the clerk of that association was taken suddenly ill and he was called away. It was a resolution requesting the passage of this bill as early as possible, and the reason I say early is because a month's delay or the delay of a couple of months, at the most, would probably put that light-house off for a year. There are only certain months in the year that I know of when the parties who are going to place the light-house there can work. They must do the work in the summer months.

The CHAIRMAN. Have you any data as to the number of vessels and the amount of cargo destroyed at that point?

Captain O'BRIEN. I have not, sir, but the life-saving station keeps a record of what they know about, but in my judgment, the percentage reported officially is very small. I think that there are innumerable lives and also vessels lost that are never heard of.

The CHAIRMAN. Give the committee some idea, if you can, of the frequency of these marine disasters and their cost.

Captain O'BRIEN. I disagree with Mr. Small, because on account of my particular knowledge I think I know a little more about the situation than he does. I travel, not in my capacity as pilot, but I go very often north and south on the Clyde Line of vessels, and I have been on one or two occasions in what we call gales of wind, and on one occasion I think we were there in a hurricane, on the steamer *Iroquois*. I think that the gales have velocity enough to make the lightship drag her anchor more frequently than Mr. Small said. I think those gales happen at least once a year and I think they will average more than that. Is that the information you desire?

The CHAIRMAN. No; I thought the committee might be interested in knowing something about the number of vessels, the value of cargoes, and the number of lives lost.

Mr. SMALL. May I answer that question?

The CHAIRMAN. Certainly.

Mr. SMALL. The Life-Saving Station Service furnished a statement of the casualties that have been reported to them for the ten years from 1890 to 1900, which showed a loss in property and shipping of more than $1,500,000 during those ten years.

Mr. STEVENS. Would not all the losses be traceable through the customs record of clearances?

Mr. SMALL. I can not say whether the manner or the extent of the losses would be reported by that method or not.

Mr. STEVENS. Every vessel that cleared from a port would be known and the destination would be known, and when she did not show up is not the loss usually traced?

Mr. SMALL. That may be true, but the Life-Saving Service only have the records of those reported in the regular channel.

Mr. ESCH. Could not that information be secured through the underwriters?

Mr. SMALL. I do not know.

Mr. BURKE. Do you know what proportion of this loss would have occurred if the light-house had been there? You do not mean that the losses and casualties occurred because it was not there, but they did occur; suppose the light-house was there?

Mr. SMALL. Very naturally, if this outer Diamond Shoal were marked by a light-house the casualties would necessarily be reduced. The fact that this shoal extends out eight or nine miles into the ocean and is covered by water, and by reason of the meeting of the currents there, which make a heavy, choppy sea and the other physical conditions, could be probably better answered by Captain O'Brien. Vessels frequently lose their bearings, go out of their course, and suddenly bring up upon this outer Diamond Shoal. They are beyond any hope of rescue from the Life-Saving Service, because the Service has no boat which could live in that sea and go out and rescue them. It means a total loss of everything, ship and cargo, but if this place were marked by a permanent aid to navigation, a structure such as this, it must necessarily tend to reduce the casualties.

Mr. RICHARDSON. What protection is there now to navigation?

Mr. SMALL. Nothing but the light-ship.

Mr. RICHARDSON. How far is that from the Diamond Shoal?

Mr. SMALL. Some 6 miles into the ocean from the outer Diamond Shoal.

Mr. ADAMSON. You stated the loss of property, but you omitted to state the loss of life?

Mr. SMALL. I do not remember it, but I can get that information and give it to the committee.

Mr. RICHARDSON. Was not a light-ship washed away in a great hurricane?

Mr. SMALL. Yes, sir; several times she has gone adrift and one time went ashore.

Mr. RICHARDSON. What year was that?

Mr. SMALL. In August, 1899, during a severe storm.

Mr. RICHARDSON. You say it is 6 miles out?

Mr. SMALL. Yes, sir.

Mr. RICHARDSON. Then there is no protection whatever at that particular place?

Mr. SMALL. No, sir; there is none.

Mr. RICHARDSON. The only protection is 6 miles out, and that was carried away in the storm?

Mr. SMALL. Yes, sir. I may say that I have endeavored to get a great deal of information from parties that carry ships engaged in our coastwise trade, and with few exceptions the sense of the information is that a light-house on this outer Diamond Shoal would be more useful to navigation than a light-ship 6 or 8 miles farther out.

Mr. BURKE. If this bill were to pass, is there any doubt about the construction of this light-house?

Mr. SMALL. I can only give you the information which has come to me. I have learned, from information which I deem entirely reliable, that the representatives of the marine underwriters of the city of Boston have looked into this project carefully and have gone over the plans of Captain Eells, know him personally—he is a native of Maine, and has lived much and done business in Massachusetts—and that those gentlemen are the associates referred to in the bill who propose to supplement whatever deficiency of capital there may be in the construction of this station; and that, to my mind, has been one of the strongest features in commendation of it, that those gentlemen should be willing to put up their money—the representatives of the marine underwriters—for this proposition.

Mr. RICHARDSON. Is it not a fact that the Light-House Board once recommended the establishment of a light-house at that place?

Mr. SMALL. Yes, sir.

Mr. RICHARDSON. They recommended a proposition and it was a a failure, and they proposed at that time to spend $450,000?

Mr. SMALL. Yes, sir; that is correct. After that, there was a communication from the Light-House Board that they did not consider the construction of a light-house practical or feasible, but since that tim the Board has determined that it might be feasible by the expenditure of $1,500,000.

Mr. RICHARDSON. What is this proposition?

Mr. SMALL. It is to cost $500,000, with an additional $90,000 to cover 4 per cent interest upon the money and the cost for maintaining the light-house for one year.

Mr. MANN. If this light-house was constructed, would it be also necessary to maintain the light-ship?

Captain O'BRIEN. In my opinion, it would not.

Mr. MANN. You think the light-ship is in the wrong place?

Captain O'BRIEN. I do not know exactly about that. The selection of the place, I suppose, was brought about by an engineering mind. As long as there is a light there, a light-ship or a light-house, it is a beacon to the mariner, and the book of instructions will inform the master of a vessel the bearings of the light, but it makes very little difference as long as it is out far enough. I mean by that, that a light-house 8 miles out would probably be just as good as a light-house 12 miles out, provided that the master of the vessel passing there would know the bearings of the light and would know the situation.

Mr. STEVENS. How far away would this light be visible?

Captain O'BRIEN. This light should be visible from the deck of a vessel, in clear weather, nearly 30 miles—that is, the loom of the light.

Mr. MANN. And how about stormy weather?

Captain O'BRIEN. That is according to the atmosphere.

Mr. MANN. I understand; but how far would it be visible at this place?

Captain O'BRIEN. The loom of the light should affect from 5 to 10 miles, I judge.

Mr. CUSHMAN. What do you mean by the "loom"—the flash?

Captain O'BRIEN. When the light flashes, there is a loom in the elements. For instant, in Pensacola, where I live, I think the light-house there is 210 feet above the level of the bay, and I have seen the loom of the light 31 miles from the masthead of a pilot boat. I have seen the loom of a light out 30 miles, but, of course, we could not tell it exactly from the light of a sailing vessel.

Mr. MANN. Is it more difficult to see that light in stormy weather or in clear weather?

Captain O'BRIEN. In stormy weather.

Mr. STEVENS. Can you rely safely on the light-ship being maintained there without dragging?

Captain O'BRIEN. No, sir.

Mr. ADAMSON. Do the storms ever rise suddenly?

Captain O'BRIEN. Yes, sir; sometimes. Sometimes they come in a manner that seafaring men call "butt head."

Mr. ADAMSON. Do they ever come within the 30 miles of the light?

Captain O'BRIEN. No, sir; not the hurricanes. They have what they call squalls.

Mr. RICHARDSON. How far is Diamond Shoal out in the ocean?

Captain O'BRIEN. The end of Diamond Shoal?

Mr. RICHARDSON. Yes, sir.

Captain O'BRIEN. About 8½ or 9 miles.

Mr. RICHARDSON. Is it not a fact that this point is considered one of the most dangerous on the Atlantic coast?

Captain O'BRIEN. Yes, sir. In the estimation of the mariner it is the most dangerous in the world.

Mr. MANN. How far is it from the shoal water to where the light-ship is maintained?

Captain O'BRIEN. I suppose it is 2 or 3 miles.

Mr. MANN. That is, the light-ship is 2 or 3 miles out?

Captain O'BRIEN. Yes, sir.

Mr. MANN. Is it dangerous there?

Captain O'BRIEN. Yes, sir; it is dangerous right where the light-ship is, but it becomes more dangerous as it shoals. The reason for the peculiar danger of Cape Hatteras has been explained. At Diamond Shoal it is so shoal and runs out so far in the Atlantic Ocean that it does not require as much wind to raise a dangerous sea, a sea that breaks. As Captain Silva explained, the top of the sea is the dangerous part. For instance, you might take a boat as long as this table and that boat would ride a sea that was 15 feet high if it was smooth, but that boat would be swamped in a sea that was only 6 feet high if it broke. The reason why Cape Hatteras is peculiarly dangerous is on account of its extension into the Atlantic Ocean in shoal water.

Mr. RICHARDSON. Making it deceptive?

Captain O'BRIEN. Yes, sir.

Mr. MANN. The place where the light-ship is ordinarily is dangerous. Will it not be necessary to still maintain that light-ship even if you put a light-house within 6 or 8 miles, because you say that in stormy weather you can only see the loom of the light for 5 miles.

Captain O'BRIEN. But by putting the light-house a little farther out. I do not know what the intention is in that respect.

Mr. MANN. I thought it was farther in—6 or 8 miles farther in?

Captain O'BRIEN. The light-ship could not be seen as far as the light-house. There may be some engineering reason for putting it in that particular spot. So far as I am concerned, a light-house within any area of 5 miles would be all the same to me.

Mr. MANN. The question is whether this is the proper place to put the light-house, unless you maintain the light-ship also?

Captain O'BRIEN. I think the light-house is to be placed there, believing it is just far enough out, and, of course, I suppose that the depth of water on account of the construction is estimated in selecting that spot.

Mr. ESCH. Where is the location to be with reference to the light-house which was abandoned or destroyed?

Captain O'BRIEN. I do not know; I am not posted on that point.

Mr. SMALL. It is substantially the same location.

Mr. ESCH. Thirty feet of water above mean tide?

Captain O'BRIEN. I am not posted on the different points of the light-house or what the constructor intends to do about it. I simply represent the mariners in the Bar Pilot Association of the United States, comprising men who are all deep-water men, from San Francisco to Maine, and then the steamboat masters and pilots, who are represented here by a committee from that organization, of which I am a member, and they voice the sentiment of 10,000 men and ask you in the name of humanity to have this bill enacted into law as soon as possible.

I thank the committee.

Mr. WANGER. What kind of a storm is a butt head?

Captain O'BRIEN. That is a squall. You see it sometimes in Washington. A dark cloud comes up and then it breaks and then the squall comes. In other words, the velocity of the wind is as high at the beginning as at any other time. They are not dangerous, however, and the sailor on a sailing boat when it comes takes in the sail and the steamers do not care about them. They simply shut up the windows to keep the rain out.

Mr. SMALL. In answer to the question asked by a member of the committee, I would say that the precise location of the structure is to be determined by the Light-House Board. The bill only provides that it shall be on outer Diamond Shoal and in 30 feet of water.

STATEMENT OF CAPT. JOHN C. SILVA.

Captain SILVA. Mr. Chairman and gentlemen of the committee, I appear for the American Association of Masters and Pilots of Steam Vessels. Our organization is made up of 10,000 people. We cover a territory from Manila to Alaska and San Francisco; on the Great Lakes, from Thousand Islands to Duluth; and on the Atlantic coast, from Key West to Eastport, Me.; and we also have representation on the Gulf and the Mississippi River. I believe that I probably *represent more* men who pass Hatteras on every trip made by our

ships than any man employed in any other capacity that I know anything about. We have in our membership such able men as Capt. Robert Quick, of the Morgan Line of steamers, controlled by the Southern Pacific Railroad. I believe Captain Quick has made more passages to the southward passage and to the northward passage of Hatteras than any other man in America. We also have Captain Kimball. The Mallory Line, the Ward Line, the Cromwell Line, and nearly all of the masters employed by the large corporations are members of our association.

Our association wishes to indorse this bill in the most hearty way we are able to do so, for this reason: Under present conditions no one is ever sure whether any signal is there to mark the spot. I know from personal experience that a light-ship is maintained there at present. I also know that that same light-ship was adrift last month.

Mr. MANN. You speak from personal experience?

Captain SILVA. From personal observation. Reports come to me from my constituents; reports come to me from licensed officers all over this country in regard to light-houses, buoys, beacons, etc. We know from personal experience of the construction of the present light-ship that marks that spot. This light-ship is supposed to be the ablest one and the strongest one ever built in this country for the purpose that she was designed for. She was built by the Fall River Engine Company, of Quincy, Mass., and she was placed on that spot. She also propels herself. She is one of the modern kind of light-ships which, in case of being dragged away, is able to steam to the station or to a harbor if necessary.

Mr. STEVENS. How long has she been located there?

Captain SILVA. I believe three or four years, and several times she has drifted away. During the intervals between the time when she drifts away and the time of being replaced there is no mark on the station, and anyone passing that mark on the coast never knows whether he has made Diamond Shoal or not.

Mr. SHERMAN. I do not think you understood Mr. Mann's question. Did you yourself see this ship adrift?

Captain SILVA. Absolutely, no, sir; I did not.

Mr. SHERMAN. Then Mr. Mann asked you whether you were misled—that is, misled in your calculations as to where you should take your ship by the light-ship being drifted?

Captain SILVA. No; not at all.

Mr. WANGER. Captain, were you sailing a vessel there, or were you receiving reports from those doing the sailing, at the time which you speak of?

Captain SILVA. Gentlemen, I want to answer that question. I will say that the New York Herald reports every light-ship that is off her station and the masters coming on the steamers that pass the stations last are the people that furnish the information to the newspapers. Captain Quick and Captain Kimball invested me with the information that the Diamond Shoal light-ship was adrift. I can not say how far she was adrift.

Mr. MANN. What did they say about it?

Captain SILVA. They merely asked me to support this bill for the association.

Mr. MANN. Did they say anything to you that they were misled by the light-ship being adrift?

Captain SILVA. Not at all; because they make no turn at that point.

Mr. STEVENS. There is not much reliance placed on the fact that the light-ship is located there?

Captain SILVA. That is the situation.

Mr. RICHARDSON. You do not think it protects navigation against danger?

Captain SILVA. I do not know. I think it is the best thing that has been done, but I think it could be improved upon, and the height of the light makes the necessity for the extra light that the light-house would give us so that we may see the mark from a distance. In fact, we never try to mark an obstruction. Mariners expect to see warning signals first and then change their course if necessary. We do not look for Diamond Shoal. We look for the mark; that is, if we are sure of it a sufficient distance to warn us that it is there. Now, if we are warned when 30 miles away from this mark, or 20 miles away from it, or even 15 miles, we think that it is much better than under the present conditions. We can only see it 7 miles off.

The CHAIRMAN. I will have to ask you to proceed a little faster. We have only fifteen minutes left, and we want to hear from the Light-House Board.

Captain SILVA. I have only a few more words, if you will permit me.

I want to say that the importance of this light-house is brought about not from the fact that any statistics will show you what dire results or what serious conditions surround shipping and the loss of life at that particular point. I do not believe that it is possible to obtain from any service of the Government or from anyone who has ever had any experience in that direction one-half of the loss of life, or more than one-third of the loss of property that has occurred at that place. Many a sailing vessel has been dismasted, and many a steamer broken down by the wind that blows on this peculiar peninsula that projects out from the land at this point, and then the wind has changed and driven ships back to sea and no one ever heard of her or her crew. I have not anything more that I think I can enlighten you with. I think that Captain Dow, of Brooklyn, N. Y., would like to be heard for a few moments.

STATEMENT OF CAPT. LUTHER B. DOW.

Captain Dow. Mr. Chairman and gentlemen of the committee, I wish to say, first, that in my travels past Cape Hatteras, it was the custom that if we were not actually bound in there, never to see the light. If we did, the changes come so quickly that we were in trouble, absolutely, and we could not get off. I have come up past there in a northeast gale of wind in a sailing vessel hoved to where we were making 4 miles leeway and have absolutely drifted to windward 2 or 3 miles an hour against a northeast gale of wind that was blowing from 50 to 75 miles an hour. The changes come so quickly there that I have gone below to look at the glass and before I arrived on deck it was upon us. The changes are so sudden, more so than in any other part of the country I was ever in.

We have always considered it one of the worst places in the world, and at my office in New York the masters of the Morgan Line, the Mallory Line, the Clyde Line, all of those that belong to the associa-

tion which I represent, come in to my office and make these reports. They say, "If it is possible for you to do anything while in Washington to have a permanent fixture off Cape Hatteras, for God's sake do it for us." These men are constantly going back and forth where I used to go. I have not been there lately. I have been ashore. If a man has a coat in cold weather he wants it, and when the coat gets upon his shoulders he wants to know there is something there. In my opinion we would rather have no light-ship at all if we were not sure that we could see it when we expect to see it. If we do not we are lost.

Mr. CUSHMAN. Would it not increase the hazard if the light-ship dragged away and floated off the station—would not the men be deceived in their reckoning?

Captain DOW. If it is not to be there at all times, do not have it there at all.

Mr. BURKE. What do you know about the drifting of the light-ship?

Captain DOW. I have not the data and statistics with me, except as they come in and are reported by the different lines.

Mr. MANN. How near does a vessel in making its regular route aim to go to where the light is?

Captain DOW. According to the conditions of the weather. If everything is good the steam vessel will go right close to it, but in bad weather you do not want to do that either with a sail vessel or a steamer, because even with a steamer you do not know when the machinery may break down, and when once in you can not get off.

Mr. MANN. How far off of the usual route do you go in bad weather?

Captain DOW. It is 8 miles in good weather. We want a mark to know that the danger is there.

Mr. MANN. How far out of the usual route?

Captain DOW. In good weather?

Mr. MANN. In bad weather.

Captain DOW. For a steam vessel?

Mr. MANN. For both kinds of vessels.

Captain DOW. There is a great difference between steam and sail.

Mr. MANN. Give both kinds.

Captain DOW. If it is a sail vessel she does not want to see it under any conditions.

Mr. MANN. How far out?

Captain DOW. I will have to differ a little from Captain O'Brien, because I think that from the deck of a vessel this light, no matter how rough, can be seen at least 20 miles off.

Mr. MANN. How far out do they aim to go for a safe route?

Captain DOW. Of this light-ship as it is now?

Mr. MANN. How many of the boats would go inside of it?

Captain DOW. In rough weather?

Mr. MANN. In bad weather how far out do they aim to go?

Captain DOW. In a sailing vessel, so they can not see it?

Mr. MANN. How many miles out?

Captain DOW. I suppose in good, smooth water it could be seen 20 miles and in rough water possibly 5 miles.

Mr. SMALL. How far out from Diamond Shoal would be the regular course in good weather?

Captain DOW. It would be according to the route she was on.

Mr. SHACKLEFORD. How far out does a vessel aim to go for safety?

Captain DOW. In bad weather?

Mr. SHACKLEFORD. Yes, sir.

Captain DOW. Ten miles.

Mr. RICHARDSON. That would depend upon the course on which she was bound?

Captain DOW. Yes, sir.

Mr. BURKE. You think that this light could be seen a distance of 20 miles?

Captain DOW. The light-house light?

Mr. BURKE. Yes, sir.

Captain DOW. By all means. It might be a little misty when you went down, but when you rose up, if it is to be a first-class light, unless it is very foggy, you would see that light out 20 miles.

Mr. RICHARDSON. What would be the difference between the light of the light-house and the light of the light-ship?

Captain DOW. The light-ship is constantly in motion and the other would be a permanent fixture. If the light-ship goes adrift, she is not there. The light-house, no matter what the storm, that is stationary; it does not drift away, and you know it is there. If that light-house can be established there, it would be one of the biggest things to the men on the water.

Mr. TOWNSEND. Captain O'Brien said that he had no record of the loss of life, because some vessels drifted out to sea. The light-house would not prevent that?

Captain DOW. If a ship leaves a Gulf port bound for New York, she may be reported somewhere, but there is no way of knowing how she was lost; she is simply missing, and then we suppose that Cape Hatteras has caused the disaster on general principles, because it is the most dreaded spot in the world. I will not except Cape Horn, under certain conditions.

Mr. ADAMSON. I understood Captain O'Brien to say that the vessels were driven in by wind on the land and then by a quick shift of the wind they were driven to sea; hence, not reported by the life-saving station.

Captain SILVA. I wish to convey the idea that many a ship has found herself in distress, sails carried away, and possibly lost her crew by a quick shift off shore, together with all record of her loss, and nobody has any statistics. That has happened many times, and most of the derelicts that are found or seen anywhere at sea have started their career from this dreadful point on the Atlantic coast called Cape Hatteras.

Mr. BURKE. If this light-house was established at a point 6 or 8 miles in from where this light-ship is now located, would it, in your opinion, be in a position where it would answer the purpose of having a light-house somewhere on that shore?

Captain SILVA. Absolutely; yes, sir.

Thereupon, the committee adjourned.

COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE,
Tuesday, January 26, 1904—10.30 a. m.

Hon. William P. Hepburn, chairman.

STATEMENT OF CAPT. CHARLES T. HUTCHINS, NAVAL SECRETARY OF THE LIGHT-HOUSE BOARD.

Captain HUTCHINS. Colonel Lockwood is the engineer expert in light-house building. He is the engineer secretary of the Light-House Board, and the building of light-houses comes under him. With that I have nothing to do, except sometimes we have opinions to express to each other. But all floating aids to navigation come under me; that means the light-vessels, and everything of that kind. I can give you some information about that light-ship, and correct some false impressions, I think, from last Friday.

The CHAIRMAN. How many of those light-ships have you at that point?

Captain HUTCHINS. We only have one there.

The CHAIRMAN Do you not need to have an auxiliary?

Captain HUTCHINS. We only have one at a time; we have two light-ships, 71 and 72. Seventy-two is now on the station. If anything happens to one of them the other is always ready. She has a small crew on board, and everything all ready aboard of her, so that she can put to sea in four or five hours.

The CHAIRMAN. What is the character of those vessels?

Captain HUTCHINS. They are steamships.

The CHAIRMAN. What is their cost?

Captain HUTCHINS. They cost, one of those vessels, about $90,000.

The CHAIRMAN. What is the cost of operating one of them for a year—that is, on the station?

Captain HUTCHINS. I am not able to tell you exactly.

The CHAIRMAN. Approximate it, please.

Captain HUTCHINS. I think it is about $13,500.

The CHAIRMAN. That is the total cost?

Captain HUTCHINS. Yes, sir.

The CHAIRMAN. All employments——

Captain HUTCHINS. All the crew and officers. I could give you that exactly for each light-ship; but I do not carry it in my head.

The CHAIRMAN. What is the cost of the other vessel while she is not on the station?

Captain HUTCHINS. She has a short crew on board. She has her own master, and a first officer, and an engineer.

The CHAIRMAN. About what would be her cost for the year?

Captain HUTCHINS. About $500—about $700 or $800 for the three months. She remains in three months and then goes out; they take turns about—three months on a station and three months off. I would like to say, Mr. Chairman, that where we build one light-ship it costs a good deal more than if we build five. We signed contracts for five light-vessels that were given us last Congress; we have an appropriation of $90,000 for each one. One firm got the whole five—the New York Ship Building Company, of Camden, N. J.—the whole five for $82,000 apiece. They are short of work in some of those shipyards.

Mr. RICHARDSON. You say that the regular light-ship that stays

there is about one hundred and forty-five or one hundred and fifty thousand?

Captain HUTCHINS. I said about $12,000 or $14,000 a year.

Mr. RICHARDSON. What does the construction of it cost?

Captain HUTCHINS. Seventy-one was built in 1889, I think, and I do not think she cost more than $80,000 or $85,000.

Mr. RICHARDSON. What would the construction of the light-house there, that Mr. Eells proposes, cost?

Captain HUTCHINS. Now, when it comes to the building of the light-houses, Colonel Lockwood will give you all the information on that subject.

Mr. RICHARDSON. The Light-House Board once recommended the building of a light-house at that point, did it not?

Captain HUTCHINS. I think not. There was a report before our Board, and the Board directed General Haines and the executive committee to investigate this thing, and they did.

Mr. RICHARDSON. Here is what the Light-House Board said on that subject then:

The Board is satisfied that it is entirely practicable to erect the necessary structures at or near the outer shoal, and in view of the dangerous character of the shoals off Cape Hatteras, of the great loss of life and property which occurs there annually, and of the urgent demands of commerce, the Light-House Board is of the opinion that provision should be made at once for the establishment of a light and fog signal at or near the outer shoal off Cape Hatteras, North Carolina, and suggestion is therefore made that the Department recommend to Congress that an adequate appropriation be made therefor.

Captain HUTCHINS. I think the last report of the Light-House Board said it was feasible.

The CHAIRMAN. What objection is there, then, to a light-house?

Captain HUTCHINS. There is no objection now to a light-house.

The CHAIRMAN. What is the reason the Board apparently has been hostile, or, at least, averse to establishing a light-house there?

Captain HUTCHINS. The only part that I want to take into consideration, with your permission, is the light-ship; I am personally interested in her. The inspector of the district is responsible to me for that light-ship, and I do not like to see that light-ship displaced and turned down in order to boost up a light-house there.

The CHAIRMAN. Why not, if the light-house is better?

Captain HUTCHINS. The light-ship is of more importance than the light-house.

The CHAIRMAN. Why? Explain that.

Captain HUTCHINS. In the first place, that light-ship is 5¾ miles from the outer shoal, and you can go 5 miles inside of that light-ship while you can run for a light-house that is there. A light-house would be built there to avoid that spot.

The CHAIRMAN. What is the light-ship for?

Captain HUTCHINS. It is something to run for.

Mr. LITTLEFIELD. You do not mean that you can not run by a light-house?

Captain HUTCHINS. You can make that light-house and keep away from it; possibly you can make it.

The CHAIRMAN. Which is the better light, the permanently fixed or the movable one?

Captain HUTCHINS. The permanent light is the better light.

The CHAIRMAN. Which is the higher light, if this plan is carried out?

Captain HUTCHINS. That light, I suppose, you can see probably 18 miles.

The CHAIRMAN. How far can you see the light-ship under the same circumstances?

Captain HUTCHINS. Why, a vessel came along the other day, the *Dixie*, one of our auxiliary cruisers, and saw it 18 miles. On that light-ship we have a searchlight, and it throws a bright light up in the sky, but on bright starlight nights we were not able to see the light when it was thrown upon the sky. The clouds help a great deal, reflecting the light.

The CHAIRMAN. Could you not have a searchlight on the light-house as well?

Captain HUTCHINS. Yes; I suppose they might have a searchlight on the light-house.

The CHAIRMAN. It would be entirely practicable, would it not?

Captain HUTCHINS. Yes; it would be practicable.

The CHAIRMAN. How often has that light-ship been displaced by storms?

Captain HUTCHINS. Since April, 1900, up to the present time she has been adrift three days. She parted her cables, went to sea, steamed back and took her place again, and then the master of her in letting go her anchor did not stopper the chain, and it went overboard.

Mr. ESCH. How long was she off her station?

Captain HUTCHINS. Three days.

The CHAIRMAN. Only on one occasion?

Captain HUTCHINS. That is all.

The CHAIRMAN. Does she always occupy the same position?

Captain HUTCHINS. Yes, sir.

The CHAIRMAN. And that position is marked on the chart?

Captain HUTCHINS. Yes, sir.

The CHAIRMAN. And well known to mariners?

Captain HUTCHINS. Yes, sir.

Mr. RICHARDSON. Is not the light vibrating—shifting?

Captain HUTCHINS. She has two electric lights, one on each mast-head, which you can see nearly 12 miles, besides the searchlight.

Mr. KYLE. It would be a bad thing to steer to if she was off her station?

Captain HUTCHINS. If she was off her station, of course. We have got a new way of mooring that light-ship and are making new mooring chains, and we think we can keep her on her station. It is not the wind that drives the light-ship off her station. Why, only last December, in that heavy storm that came up our coast, the wind was blowing 90 miles an hour, and she held on beautifully.

Mr. LITTLEFIELD. What is it that drives her off?

Captain HUTCHINS. Last February, when she got adrift, it was only blowing about 60 or 70 miles an hour. It is the sea. It is not the wind—not the severe hurricanes and typhoons. You get in the center of one of those and you find the wind blows everything right down.

Mr. LITTLEFIELD. Is it not a matter of common knowledge that the wind makes the sea?

Captain HUTCHINS. Yes.

Mr. LITTLEFIELD. If you get it long enough, you get both sea and wind?

Captain HUTCHINS. I am only telling you what is the fact. The

Gulf Stream current sets up there northeast sometimes, and when it does it sets pretty strong, and that slews the light-ship's stern around. Instead of riding ahead to the sea, she rides with the sea a little on her bow, and when the sea strikes the bow, something probably has to give way. We now have what we call an automatic windlass. The chain is over this windlass, and when it comes on to blow very heavily the steam is turned on the piston, and the chain cable goes out when a sudden strain is put on it; and when the strain eases on the cable, it takes it in again. So we expect to keep that light-ship on her station.

Mr. LITTLEFIELD. You hope to?

Captain HUTCHINS. Yes.

Mr. BURKE. Was this ship adrift last month, or very recently?

Captain HUTCHINS. An Italian came along; did not know where he was, and he steamed around there a couple of hours. Lots of people go to sea that do not know how to navigate a ship. He could not find the light-ship, and he came in and reported it. We telegraphed down there Sunday, and early Monday morning we got a telegram back that they had seen the lights at 3 o'clock Monday morning. She was not off her station. A lot of people come along there and report her off.

Mr. LITTLEFIELD. Because they can not see her?

Captain HUTCHINS. Yes, sir.

Mr. BURKE. Do you wish to have that as a part of your statement, that they can not see her?

Captain HUTCHINS. Can not see what?

Mr. BURKE. The light-ship.

Captain HUTCHINS. Because they do not know where they are. They are out of their reckoning. Here is a vessel the other day that saw this light 18 miles away. That light-ship is 5¾ miles from the nearest shoal. No seaman or sailor-man will ever give up that light-ship there; she is there to stay. That is my opinion. I have been around Hatteras a good many times. I was down there two years ago and I ran for that light-ship, and I always try to run for it.

The CHAIRMAN. Would not the light-ship be necessary if the light-house were erected as contemplated in this bill?

Captain HUTCHINS. The light-ship is very necessary.

The CHAIRMAN. Why?

Captain HUTCHINS. The hot air rises from the Gulf Stream and the cold northerly air strikes it; it is condensed, and in fine weather it shuts in Hatteras.

The CHAIRMAN. What is the depth of water where that vessel is anchored?

Captain HUTCHINS. Thirty fathoms. She now has two mushroom anchors on the bottom. They weigh 5,000 pounds each. At about 250 feet from the light-ship there is a can buoy on her cable. When it comes on to blow the ship has got to rise to the sea or she'll go down. She is not able to rise to the sea with all that weight. When she drags off you have got to cut away everything or she will founder, because her stern goes up in the air and she bows right down.

The CHAIRMAN. How, at such a time as that, do you keep her on her station—steaming?

Captain HUTCHINS. If she is driven off she steams right back again.

The CHAIRMAN. So she might be off two or three hours and get right back? That has happened frequently?

Captain HUTCHINS. Since April, 1900, she has been off her station three days.

The CHAIRMAN. Including these times?

Captain HUTCHINS. All the time that spot was vacant.

Mr. ADAMSON. You mean you add your hour and two-hour periods together?

Captain HUTCHINS. These three days.

Mr. ADAMSON. You mean three whole days?

Captain HUTCHINS. Yes, sir.

Mr. ADAMSON. How many times has she driven away just for an hour?

Captain HUTCHINS. Not at all since April, 1900.

Mr. CUSHMAN. This three-day period you speak of means she was gone three full days at one time?

Captain HUTCHINS. Yes; and that is the only time.

Mr. RICHARDSON. When was that she was gone three or four days?

Captain HUTCHINS. On the 16th of February.

Mr. RICHARDSON. Of last February?

Captain HUTCHINS. She broke adrift on the 16th of last February and was replaced on her station on the 19th of February.

The CHAIRMAN. Where was she in the mean time?

Captain HUTCHINS. She was at sea a part of the time. She broke adrift, came back again, and tried to anchor. She parted her cable and they got another cable to anchor with and that went overboard and she went back to Hampton Roads. The crew was about tired out and they ran ashore.

Mr. CUSHMAN. Will you please explain what you mean by the expression that she was absent from her station an hour or two and then steamed back?

Captain HUTCHINS. This time when she was off three days she steamed back to her station again, and had to leave and go back to Hampton Roads, where she could get anchors and cables.

Mr. SHERMAN. You stated that when the sea was very heavy it was not possible for her to retain her connection with this buoy?

Captain HUTCHINS. I did not say it was not possible. I said the time she did get adrift was when this heavy sea——

Mr. SHERMAN. I understood you to say that when it was not possible for her to get loose she would go down.

Captain HUTCHINS. She used to drag a good deal. She is not able to drag those anchors—those 5,000-pound anchors.

Mr. SHERMAN. She is held right there?

Captain HUTCHINS. Yes, sir.

Mr. SHERMAN. The sea never does get so heavy that holding on to the cable she would be swamped with the anchor on the bottom?

Captain HUTCHINS. No, never yet.

Mr. SHERMAN. I understood you differently.

Captain HUTCHINS. We have never lost any of our light-ships anywhere.

Mr. RICHARDSON. I understood you to say, if the light-house was erected where Mr. Eells proposes, that you would still have to have a light-ship?

Captain HUTCHINS. Yes, sir. I have not any doubt about that.

Mr. RICHARDSON. What is the distance from the light-ship—where it is anchored or moored—to where Mr. Eells proposes to put that light-house?

Captain HUTCHINS. I do not know where he proposes to put that; but I would say about 6¼ miles. She is now 5¾ miles from the shoals.

Mr. RICHARDSON. What are your reasons for saying if the light-house was put up there you would still have to have the light-ship? Why would not the light-house answer all the purposes of a light-ship?

Captain HUTCHINS. In bad weather you might not pick that light-house up, and when you got in to hear the fog whistle you would probably get ashore.

Mr. CUSHMAN. Please explain on the map where the light-ship is and where the light-house is proposed to be put.

Captain HUTCHINS. I do not know where Captain Eells wants to put the light-house. There [indicating] is the light-ship.

Mr. CUSHMAN. That is where it is now?

Captain HUTCHINS. Yes, sir; that [indicating] is the light-house.

Mr. CUSHMAN. The light-house is proposed to be put nearer in there?

Captain HUTCHINS. Yes, sir. In here [indicating]. That is about 5 miles. I will leave that to Colonel Lockwood to explain. That is the most difficult place in which to build a light-house, I suppose, right there [indicating]. The most difficult place you could pick out of that whole plan to build a light-house on.

The CHAIRMAN. Is it the most desirable?

Captain HUTCHINS. Yes; I think it would be the most desirable place.

Mr. WANGER. Did I understand you to say, Captain, it is most desirable on the shoal or out where the light-ship is now located?

Captain HUTCHINS (indicating). That would be the most desirable place for a light-house. Nobody could build a light-house there. That [indicating] would be the next desirable place; that would be an easier place to build it—in there [indicating].

The CHAIRMAN. Why?

Captain HUTCHINS. Because it is protected by those shoals, easterly and northeast gales. You only have the wind coming up here. [Indicating.]

Mr. ESCH. Would not two lights be more dangerous to navigation than one?

Captain HUTCHINS. No, sir; you can not mistake a light-house for a light-ship. Coming up the coast here most of these wrecks occur from coming this way. You see you can run right straight for that light-ship. A fellow ran for her the other day and hit her. About ten days ago a schooner came along and cleaned out the davits and boats on one side. The fog whistles are very uncertain. A vessel ran ashore on Little Gull Island, Connecticut. The fog whistle was going all the time, and I think the whistle was only six or seven hundred feet from her when she struck.

The CHAIRMAN. In a gale such as you have spoken of, how far could you hear the fog whistle?

Captain HUTCHINS. It all depends on the conditions, and nobody can tell what those conditions will be.

The CHAIRMAN. Under favorable circumstances—when the wind was blowing toward you from the whistle?

Captain HUTCHINS. It does not make any difference whether the wind is from you or toward you. At Cape Elizabeth we hear a fog whistle in Portland with a northeast wind dead against it. There is a

fog whistle on this light-ship, and you can hear that fog whistle, I should say, 5 or 6 miles. You put a fog whistle on that light-house there, and if you did not hear it, and were running for it, you would go ashore in a fog.

The CHAIRMAN. You probably would hear it, would you not? If you could hear the other 5 miles, why could you not hear that on the light-house?

Captain HUTCHINS. Mr. Chairman, that is under favorable conditions.

The CHAIRMAN. Under these favorable conditions what is the value of the fog whistle? Is it of any value under unfavorable conditions?

Captain HUTCHINS. Oh, yes; I suppose when you got up to the light-ship you could hear it.

The CHAIRMAN. How close?

Captain HUTCHINS. Say half a mile or a mile. Now, you see you run for that light-ship, and the only question is whether you are going to run her down or not. You do not run ashore when you run for the light-ship. But you run ashore when you run for the light-house in a fog and do not make it.

Mr. CUSHMAN. If there was a light-house there, a man would not run for the light-house; he would simply take his bearings from it?

Captain HUTCHINS. Steer clear of it. Coming up the coast we will pass outside of that light-ship 4 or 5 miles. We know the current sets in there, as a rule; it does not all the time. With strong westerly winds the Gulf Stream moves off the coast and with easterly winds it moves on the coast. Where the light-ship is here we have a current of 3 knots; I have known it to run 4¼ knots northeast. There is a countercurrent here [indicating] which runs down here most of the time that gets out there to the light-ship frequently—moves out.

Mr. RICHARDSON. I want you to explain to me, because I do not understand it. You said at a certain time you attached two 5,000 weights to the light-ship?

Captain HUTCHINS. To her cable.

Mr. RICHARDSON. To hold it steady?

Captain HUTCHINS. To anchor the ship with.

Mr. RICHARDSON. When was that done?

Captain HUTCHINS. I think it was done after she got adrift last February.

Mr. RICHARDSON. That was done last February?

Captain HUTCHINS. Yes, sir.

Mr. RICHARDSON. After she had been off three days?

Captain HUTCHINS. Yes, sir.

Mr. RICHARDSON. When you attach that 10,000-pound weight to the light-ship for the purpose of holding it steady, so that there would be no vibration or waving of the light to those who are navigating around Cape Hatteras, what is the limit to which it could vibrate backward and forward? I mean the light-ship.

Captain HUTCHINS. Swinging around?

Mr. RICHARDSON. Yes, sir.

Captain HUTCHINS. I do not know; 600 or 800 feet.

Mr. RICHARDSON. Would it go 100 feet or 200 feet?

The CHAIRMAN. Six hundred or 800 feet?

Captain HUTCHINS. Yes, sir.

Mr. RICHARDSON. And that would make the light vibrate?

Captain HUTCHINS. No; the only thing that would disturb those lights is the roll of the ship.

Mr. RICHARDSON. When you have those immense weights attached to that light-ship, is it not more likely that the heavy waves of the sea, with those weights attached to that ship, would prove disastrous to the light-ship?

Captain HUTCHINS. No, sir. Those weights are on the bottom; buried in the sand.

Mr. SHACKLEFORD. Straight up to the vessel and holding it right steady?

Captain HUTCHINS. There are 165 fathoms of chain. That is nearly 1,000 feet.

Mr. BURKE. When was she adrift before February last?

Captain HUTCHINS. On the 5th of April, 1900, she dragged about 2 miles northeasterly away from her station.

Mr. BURKE. Now, when she was adrift in February, 1903, how was she anchored?

Captain HUTCHINS. She was moored just the same as she is now. I do not think she had as heavy an anchor as she has now, but she parted her cable. Her cable was a poor cable. I have two specimens of it on my desk at the office.

Mr. BURKE. That may happen at any time?

Captain HUTCHINS. It may happen. If we could keep that light-ship there on her station, nobody would want a light-house, no sailor man—a man who cruises up and down there.

Mr. RICHARDSON. If it gets away from there, a light-house is needed?

Captain HUTCHINS. That is the unfortunate part. If we could get telegraphic communication from the office here—this light-ship is 14¼ miles from the light-house—as soon as that light-ship gets adrift, they can telegraph, and we can send another light-ship right out.

Mr. ESCH. Do you expect to install the electric system on the light-ships?

Captain HUTCHINS. Yes, sir; it is put in by the New York Herald people, and we have nothing to do with it.

Mr. ESCH. Did the work succeed?

Captain HUTCHINS. I think it has done so——

Mr. ESCH. Your advantage in having a wireless telegraph on the light-ship would be that you could notify the other ships to come out?

Captain HUTCHINS. Yes, sir.

The CHAIRMAN. Who is S. D. Rowan, Vice-Admiral of the United States Navy?

Captain HUTCHINS. He was admiral, if you remember, during the civil war.

The CHAIRMAN. Was he at any time connected with the Light-House Board?

Captain HUTCHINS. He was chairman of the Light-House Board.

The CHAIRMAN. Was he a scientific man?

Captain HUTCHINS. Yes; I think he was.

The CHAIRMAN. A man whose opinions would be valuable on questions of this kind?

Captain HUTCHINS. Very valuable.

The CHAIRMAN. Do you know that he gave this opinion on the 21st of January, 1888?

The matter of the establishment of a light-ship, as requested by the petitioners, was referred to the inspector of the Fifth light-house district for report, and on January 9, 1883, that officer reported that to establish a light-ship as asked would simply cause a continued loss of life; that all gales from the southward and eastward, which are extremely severe there, would have a tendency to cause the light-ship to break adrift, and that no earthly power could prevent every soul on board from being lost on the shoals to leeward, as the sea is heavy at all times.

Do you coincide with that opinion?

Captain HUTCHINS. I would have, at that time; yes, sir. We have solved the difficulty now. Besides, then, I do not think we had anything but sailing light-ships. These are steam light-ships and are able to take care of themselves.

The CHAIRMAN. On the same date that gentleman also said: "At its session held September 28, 1883, the Board had under consideration the matter of the establishment of a light-house on the outer shoal off Cape Hatteras, when the conclusion was reached that a light-house should be erected thereat, providing that the engineering difficulties were found not to be insurmountable."

Do you agree to that?

Captain HUTCHINS. Yes, sir. I want to see a light-house there.

The CHAIRMAN. Do you believe the engineering difficulties are insurmountable?

Captain HUTCHINS. I believe it is feasible to build a light-house there.

The CHAIRMAN. Do you believe it is feasible to build a substantial and sufficient light-house within reasonable cost?

Captain HUTCHINS. I believe the Light-House Board has made plans for $1,688,000, and I believe it is about right.

The CHAIRMAN. What kind of a light-house is that?

Captain HUTCHINS. That would necessitate the building of a breakwater. I wish you would let Colonel Lockwood take that up, because that comes under him.

The CHAIRMAN. The Board had determined all of these matters upon consultation?

Captain HUTCHINS. Yes, sir.

The CHAIRMAN. It is the action of the Board, is it not? Not of a member of the Board?

Captain HUTCHINS. Yes, sir.

The CHAIRMAN. Any results that you arrived at?

Captain HUTCHINS. Yes, sir.

The CHAIRMAN. Therefore you have your opinions on this subject, and it is your opinion that you would be glad if he would give us?

Captain HUTCHINS. Yes, sir.

Mr. RICHARDSON. On March 13, 1889, the Light-House Board entered into a contract to erect a light-house at that place for $485,000. Why do you put it at $1,688,000 now?

Captain HUTCHINS. You see, after an investigation carried on there for some time, by General Haines, of the Engineer Corps, they concluded the only way to do was to establish a base at Hatteras Inlet—I think that must be 14 or 15 miles from where that light-house would be—and dig this out and have sea tugs and scows, and then all the stone brought in here [indicating] and put on these scows, and carry it out here and place in this breakwater [indicating].

The CHAIRMAN. How are you going to get that placid sea that would enable you to do that?

Captain HUTCHINS. You can dump the stone in any kind of weather except in a heavy gale.

The CHAIRMAN. Your purpose was to have a foundation of loose stone?

Captain HUTCHINS. You put it in there until it stops going down. I do not know how deep they have bored there—probably 100 feet.

The CHAIRMAN. Do you approve a scheme of that kind, having a loose wall of that description?

Captain HUTCHINS. That, I believe, has been approved by the Light-House Board—that is, before I came to the Light-House Board as naval secretary.

The CHAIRMAN. Does it meet your approval now?

Captain HUTCHINS. Yes, sir. That scheme, I think, is a very good one. It is the only one I do know of that I would recommend.

The CHAIRMAN. You would simply build a huge pyramid of loose rock and them put the light-house on top of it?

Captain HUTCHINS. In the middle of it. A sort of breakwater around it.

The CHAIRMAN. What would be the extent of that?

Captain HUTCHINS. That would probably be 12 or 13 feet in circumference——

The CHAIRMAN. On the sides?

Captain HUTCHINS (continuing). And stone alone would cost about $680,000.

The CHAIRMAN. In place or on shore?

Captain HUTCHINS. To put it in place.

The CHAIRMAN. Inside of the inclosure you would build your light-house?

Captain HUTCHINS. Build the light-house inside.

The CHAIRMAN. Give us some idea of the dimensions of that pile of stone you would build there in the sea.

Captain HUTCHINS. I do not think there is any plan gotten up for the building of that light-house. If there is I do not know what it is.

The CHAIRMAN. What would be its height above mean tide?

Captain HUTCHINS. One hundred and sixty feet or 175 feet.

The CHAIRMAN. Above mean tide?

Captain HUTCHINS. The rise and fall of tides is not very much there—6 or 8 feet.

The CHAIRMAN. I am asking you what would be the character of this breakwater?

Captain HUTCHINS. The stone is only dumped in.

The CHAIRMAN. Now, how high would you carry that above the water?

Captain HUTCHINS. That would depend; it is hard to say how high. So that it would protect the base of the light-house.

The CHAIRMAN. Above the waves?

Captain HUTCHINS. Yes, sir.

The CHAIRMAN. Above the highest waves?

Captain HUTCHINS. Yes, sir; it would probably be 35 or 40 feet.

The CHAIRMAN. The water there is about 30 feet deep where they are to build the light-house?

Captain HUTCHINS. Yes, sir.

The CHAIRMAN. How wide would that breakwater have to be on its upper surface?

Captain HUTCHINS. I suppose 15 or 20 feet wide.

The CHAIRMAN. And it would be 14 feet on its side? Fourteen times 14 feet?

Captain HUTCHINS. Yes, sir. I intended to say that this breakwater would be about 1,200 or 1,300 feet long (around) with a small opening on one side and 15 or 20 feet wide on its top. There would be an opening where you could get into it.

The CHAIRMAN. Now, what kind of a structure would you build inside of that breakwater?

Captain HUTCHINS. That I do not think has been definitely decided. If it has been, I do not know. Anybody can build a light-house in there if they can get a breakwater and the breakwater will stay. That is the least difficult part of the whole thing.

The CHAIRMAN. That is under the supposition that it would be water-tight?

Captain HUTCHINS. From 1875 to 1902 there were 97 wrecks, a probable loss of $3,000,000, and a loss of 62 lives. Eighteen of these wrecks were on the outer and 9 on the Diamond Shoal. That is from 1875 to 1902. In 1902 there were 2 wrecks—2 schooners—one on the inner Diamond Shoal and the other on the outer Diamond Shoal. Their value was about $30,000 and only one lost. In 1903 there was a steamer wrecked and a schooner wrecked, and one up here [indicating] in a little place here, where they get in, some way or other, and there was another one on Cape Hatteras, a little fellow valued at $8,000. He got off. On January 3, 1904, there was one wrecked on Hatteras.

The CHAIRMAN. Give us a summary. We have not time for the details. Do you think you have a record of all the wrecks?

Captain HUTCHINS. That is the record of the Life-Saving Service.

The CHAIRMAN. Where did you understand the position of the light-house as proposed by Captain Eells should be?

Captain HUTCHINS (indicating). Perhaps here on the chart.

The CHAIRMAN. That is on the outer Diamond Shoal?

Captain HUTCHINS. Yes, sir.

The CHAIRMAN. That is the place it should be, if at all?

Captain HUTCHINS. No, sir; not if at all; I do not believe you could build a light-house there.

The CHAIRMAN. If you can build one, that is the best place to build it?

Captain HUTCHINS. Yes, sir; that would be the best place for it.

The CHAIRMAN. Why do you think you can not build one there?

Captain HUTCHINS. The seas are too heavy and the weather is too bad. I do not see how you could get a foundation.

The CHAIRMAN. You do not have to have a foundation, according to the plan of Captain Eells. You spoke of having a contract there and trying to build a light-house down there, and they took a caisson down—that was a plain flat-bodied caisson—and was without any apparatus or steam for sinking it into the sand. No provision for a sand pump or anything of that kind about that one?

Captain HUTCHINS. Yes, sir. They could not have sunk it without this——

The CHAIRMAN. They did not propose to sink it. They proposed to lay it on the bottom and hold it there by concrete?

Captain HUTCHINS. Yes, sir; they were to sink it down, I have forgotten how many feet.

The CHAIRMAN. In your judgment, as an engineer officer——

Captain HUTCHINS. I beg your pardon; I am not an engineer officer.

Mr. LITTLEFIELD. You are a practical seaman?

Captain HUTCHINS. Yes, sir; I am a naval officer and a line officer.

Mr. LITTLEFIELD. You showed me the other day, Captain, if I remember correctly, a copy of a letter written to the committee, or somebody, making inquiry about this bill, and the letter contained certain suggestions with reference to additional room and accommodations for crews and supplies?

Captain HUTCHINS. Colonel Lockwood will tell you about that.

Mr. LITTLEFIELD. I asked the Colonel, but he did not happen to have it with him. The inquiry was simply this, If this plan of Captain Eells provided for these contingencies you suggested, in addition to what had been intimated, whether you saw any practical objection to allowing him to take the risk of making this experiment?

Captain HUTCHINS. I would not want—personally, as I said before, I want to see a light-house built there.

Mr. LITTLEFIELD. As long as it is his money?

Captain HUTCHINS. In my opinion, I do not believe it is possible——

Mr. LITTLEFIELD. So far as you are concerned, Captain, as a member of the Board, have you any objections to his risking his money in making the experiment?

Captain HUTCHINS. I have no objections at all.

Mr. LITTLEFIELD. Do you see any harm, then, in allowing the adoption of the legislative proposition that risks his money and nobody's else?

Captain HUTCHINS. I do not believe the Light-House Board would sanction any plan unless they were certain it was to be successful.

Mr. LITTLEFIELD. You are not asked to sanction it. If Captain Eells by experimenting with his own money could demonstrate no plan was successful, you would be glad to have him do it, as a practical business proposition?

Captain HUTCHINS. I would like to see a light-house.

Mr. LITTLEFIELD. You would like to see anybody demonstrate, no matter on what plan. If the thing could be made a practical business success, do you see any objection to his being allowed to make that experiment at his own expense?

Captain HUTCHINS. I can only speak for myself. I do not speak for the Board. I do not know any objection.

Mr. SHACKLEFORD. What injury could result to anybody by his making the attempt?

Captain HUTCHINS. I do not see what injury it could do.

The CHAIRMAN. If he is going to furnish this money himself to make this experiment, why is it not the duty of the Light-House Board to cooperate with him——

Mr. HUTCHINS. They will help him all they can.

The CHAIRMAN (continuing). In a friendly spirit, and help him in every way they could?

Mr. LITTLEFIELD. In the hope that a feasible method could be obtained?

Captain HUTCHINS. I suppose they will. I do not think the Light-House Board has any objection to anybody going to work there, but they do not want to shoulder anything.

The CHAIRMAN. The Light-House Board is not asked to shoulder anything in this matter. We have simply asked you to give us such information as you will, and then, I think, everybody would expect the Light-House Board, if the matter was undertaken, to give it such friendly cooperation as possible, without assuming responsibility.

Mr. BURKE. If the experiment is a failure, it would not cost the Government anything; if it is a success, it would save the Government about a million dollars on the estimate which you say has been made by the Light-House Board.

Mr. RICHARDSON. It is not a fact that the plan originally made by the Light-House Board to erect a light-house at Hatteras was a failure?

Captain HUTCHINS. I do not know.

Mr. RICHARDSON. They approved it away back there in 1888?

Captain HUTCHINS. I do not know whether they did or not.

Mr. RICHARDSON. Their plan failed, and now Mr. Eells wants to make another plan.

Captain HUTCHINS. I have not any doubt but that somebody will build a light-house there. The first may be a failure, but the second may not be a failure.

Mr. RICHARDSON. On March 1, 1889, they approved of a plan, and Anderson & Barr went to work on it. The water came along and washed it all away?

Captain HUTCHINS. Yes, sir.

Mr. RICHARDSON. Your plan was a failure. Mr. Eells comes along with another plan and he wants to try his, and I do not see why your Board should object to it at all. The proposition of the Light-House Board at that time was $400,000; now you put in an estimate of $1,600,000.

STATEMENT OF LIEUT. COL. D. W. LOCKWOOD.

The CHAIRMAN. What is your position in connection with the Light-House Board?

Colonel LOCKWOOD. I am a member and engineer-secretary.

The CHAIRMAN. Are you from the Army or Navy?

Colonel LOCKWOOD. Army.

The CHAIRMAN. How long have you been connected with the Light-House Board?

Colonel LOCKWOOD. Two years and a half.

The CHAIRMAN. Do you belong to the Engineer Corps of the Army?

Colonel LOCKWOOD. Yes, sir.

The CHAIRMAN. How long have you been in the service as a member of the Engineer Corps?

Colonel LOCKWOOD. Since 1866.

The CHAIRMAN. Are you familiar with the plans of Captain Eells with reference to this light-house that he proposes to build on outer Diamond Shoal?

Colonel LOCKWOOD. No, sir; and that is the one objection to the bill that the Board has.

The CHAIRMAN. What objection? State the objection.

Colonel LOCKWOOD. Well, it does not give sufficient details to enable any analysis to be made of it, except in a certain general way; and I would like to say something in regard to those things, if you will allow me.

The CHAIRMAN. Go on, if you please, now.

Colonel LOCKWOOD. The part of a light-house that constitutes an aid to navigation is the part above the water, or above the land, and in planning a structure it is usual and logical to determine, first, what is wanted, and then determine the character of the foundation to support what is actually necessary. In this case the foundation is given, and all that is to constitute the aid to navigation is covered by the word "suitable"—"suitable quarters," "suitable arrangements," and so forth. This structure has an opening in it 20 feet above the water. There is not another light-house in anything like the exposed position that this will be in, that has an opening less than 30 or 40 feet above the water. At the Graves, where the seas are broken by the rocks lying outside, the entrance is 41 feet.

The diameter of the lower floor 20 feet above high water is 27½ feet. I do not know whether it is inside or outside measure—and the diameter of the top is 25 feet. It is to be surmounted by a steel tube that will have to be in the neighborhood of 150 feet high to get the necessary 200 feet, I think. Now, a steel tube to carry the stairway has long been used in the Light-House Establishment—first in 1852 when the Carysfort reef light in Florida was built, and it has been used in nearly all of the light-houses built on the Florida coast; it is used on land. There are a dozen of them; and in no case has the unsupported tube been found sufficient to carry the light; it is not stiff enough to support itself. It is always braced and supported by an outside framework. There was one case tried, but within the last year and a half that tube had to be strengthened by structural iron-work outside.

A MEMBER. How long had your tube been erected before last year?

Colonel LOCKWOOD. It had been built five or six years, but it was unsteady from the first.

Mr. CUSHMAN. The strength of the tube would depend on the thickness of the tube, would it not?

Colonel LOCKWOOD. Yes; and the size of it. The great trouble is the oscillation.

Mr. SHACKLEFORD. The length of it in proportion to its diameter.

Colonel LOCKWOOD. Then there is another point, Mr. Chairman. This tube has to go down through to the foundation, into it, somehow, and this will take a certain amount of space out of those two floors that are alone provided for in the bill. They take out the part that affects the available area most, right in the center. When the former light-house was under consideration, General Casey and General Craighill—both Chiefs of Engineers later—and Colonel Gregory drew up what was called the general requirements that a light-house built in this locality must fulfill, and about the first thing was that the opening to the tower should be placed 30 feet above high water; that the lower floor should be large enough to contain three boats, one of which was to be 25 feet long, and one 20, and one 18; that provision should be made for storing so much coal and water—the water to be stored in a tank prepared in the foundation—and the fog-signal apparatus was to be on the second floor.

The mouth of the horn would be 45 feet, at least, above the water. They can not install a modern fog-signal apparatus on the second floor of this caisson; there is no room for it. Where the men are going to live I do not know; there is no room for them. There is not one-third—probably not one-quarter—of the necessary room provided.

Then, again, in regard to this tube, an ordinary chimney carries only its own weight. This will have to carry at its upper end a weight of between 20 and 25 tons. The lantern will weigh 11 tons, and then there is the service room below, and the watch room. Those are very necessary additions to this structure.

I have here some sketches that show the arrangement at the top where a tube is used [handing sketches to the members]. That is one of the latest lights built. That is Cape Fear. It will be impossible to set it up in that tower if it is built, and I do not think it is possible that it could carry the weight with the area exposed to the wind. It would not be possible to set up anything but one of the old-fashioned lights that are practically out of date. The light is put at 200 feet, presumably to keep the spray off the lantern, and if the sea throws spray 200 feet high, what is going on at the base no one can tell. It was figured the waves would not be higher than the depth of water. That is very safe, but that would make them about 30 feet, maximum height.

Mr. LITTLEFIELD. There is 30 feet of water there?

Colonel LOCKWOOD. Yes, sir.

Mr. LITTLEFIELD. What is the bottom, sandy or——

Colonel LOCKWOOD. It is sand. Borings down 105 feet show soft sand and mud—practically quicksand. This caisson that Anderson and Barr put down there sank 15 feet of its own weight, and the scouring undermined one side of it so that one side was 7 feet higher than the other.

The CHAIRMAN. Did they have any method of lowering that by extracting the sand underneath it?

Colonel LOCKWOOD. They figured on going down 80 feet if they had to use the pneumatic process, or 100 feet if they dredged.

The CHAIRMAN. Would it not be practicable for you to give to this committee the ideas of the Board as to what the accommodations for the crew should be, so that we could——

Colonel LOCKWOOD. I could not tell you offhand about that.

The CHAIRMAN. Can you not do it later, so that if we conclude to go on with this matter we may embody those necessary requisites in a bill? You say that in these three stories there is not room enough——

Colonel LOCKWOOD. There are only two.

The CHAIRMAN. Two or five, or whatever there may be. You say the opening should be many feet above where it is proposed. Now, we ought to have the advantage of your judgment on that so that we can acquire——

Colonel LOCKWOOD. I want to say, Mr. Chairman, the English have had a great deal of trouble with the Eddystone light; it has been rebuilt a number of times, due to the sea striking it and running up the sides; in the last construction they put in vertical faces so as to break the sea. With this structure, sloping up as it does, with caisson 40 feet high, that steel structure, 40 feet above the water, will be fairly smothered in a gale of wind. They will not be able to open it.

There is no provision made for the boats. If any accident happens, and if they want communication with the shore, they have got to take their own boat and go ashore. The reference to Minots Ledge that is made in this bill is hardly a proper one to make, because the situations are not comparable. Minots Ledge is 1⅛ miles in a direct line from the shore station, and the keepers can communicate with the

shore by signal or boat. They hoist their boat up on the outside, but they have to hoist it 83 feet above the water.

Mr. SHACKLEFORD. Could a telephone be connected with the light-house there from the shore?

Colonel LOCKWOOD. The wire would have to go across the shoals, and it would be cut about as much of the time as it would be in order. I do not think it would be feasible to maintain it. It would be a very expensive and a very uncertain system.

Mr. SHERMAN. That is an overhead telephone you are speaking of?

Colonel LOCKWOOD. No, sir; I mean one under water.

Mr. SHERMAN. You mean a cable.

Colonel LOCKWOOD. Yes; it would be put down on the shoal.

Mr. SHACKLEFORD. Would it not get in the sand so as to be beyond washing?

Colonel LOCKWOOD. I am only giving the results where the Board have tried that sort of thing.

Mr. LITTLEFIELD. There is a cable 12 miles long at Rockport, and they do not have any trouble with it.

Colonel LOCKWOOD. I would not, as a business proposition, consider that as absolutely reliable. I would sooner rely on wireless telegraphy.

The CHAIRMAN. Suppose this light-house should be erected, in your judgment would the light-ship still be necessary?

Colonel LOCKWOOD. Yes, sir; I have no doubt of that. My mind is perfectly clear on that point.

The CHAIRMAN. Suppose this light-house should be built, has Captain Eells made proper selection for its location?

Colonel LOCKWOOD. That is left to the Light-House Board by the bill. It is an open question as to whether it ought to be on the eastern end or the western end of the outer Diamond Shoals. They are 3 miles apart.

Mr. CUSHMAN. Please indicate on the map.

Colonel LOCKWOOD (indicating). It is a question as to whether it should be out here or in here on the western end.

The CHAIRMAN. What is your judgment as to where it should be?

Colonel LOCKWOOD. I have not any decided opinion. I should say it ought to be in here, by reason of the fact that most of the wrecks that occur are down here.

The CHAIRMAN. In your judgment is there a disposition on the part of the Board, in view of the fact that this is an experiment that is not to cost the Government anything, to cooperate and give us the benefit of your judgment and your aid, so as to get the best possible scheme for this work?

Colonel LOCKWOOD. Mr. Chairman, this is a proposition that the Light-House Board has nothing to do with according to the bill, except to furnish the lens and equipment, and I do not think the bill is clear on that point; whether it means the Board should put it up or whether Captain Eells should put it up is not clear.

The CHAIRMAN. Have you any objections to helping this committee to get that into a definite and proper shape, so as to get the best possible results for the Government out of this experiment?

Colonel LOCKWOOD. I am perfectly willing to give all the information that the Board has with regard to what it considers to be necessary in a light-house in this locality; but so far as the foundation is

concerned, the Board, I think, has no suggestion to make about that. I certainly would have none.

Mr. LITTLEFIELD. You do not want to assume any responsibility?

Colonel LOCKWOOD. Not a bit.

Mr. RICHARDSON. You do not assume any responsibility in this bill at all, do you?

Colonel LOCKWOOD. No; except after it has been operated a year the Light-House Board takes hold of it and operates it for four years, and after the Light-House Board has operated it for four years the Secretary of War certifies it is all right.

The CHAIRMAN. The reason for that was, it was believed the Light-House Board was believed to be hostile to this scheme?

Colonel LOCKWOOD. I do not think any member of the Light-House Board would be hostile to any—I would not use the word "scheme," but I will say—any plan for any light-house in that locality that is regarded as feasible and possible of construction, and that would answer the purposes of a light-house when completed, when it has to take hold of it. You see, the Board has got to operate this as it stands there. It is a light-house that is going to cost a good deal, and in the opinion of the Board it ought to be one with the most modern of illuminating apparatus that can be put in.

The CHAIRMAN. Why is it not the part of wisdom on the part of the Board to help us to get the proper description of what should be put in there? Suppose you were to provide new specifications as to what should be used for a perfect light-house, for the accommodation of the crew, and for the practical uses of this structure.

Colonel LOCKWOOD. That is already given.

The CHAIRMAN. Put that into the specifications.

Colonel LOCKWOOD. That has already been given by the Board—its opinion as to what the requirements in a light-house at that point are. That is given in the report of 1890.

Mr. LITTLEFIELD. Can you not give the committee in a succinct form what details would be necessary to be added to the provisions in order to produce what you would look upon as a proper and perfect light-house structure, with sufficient room, with an aperture high enough, sufficient room for the storage of provisions, sufficient room for the people that are looking after the light, maintenance of the light, and everything that is modern and up to date? Can you not give succinctly the information of what should be added to the bill in order to procure that kind of structure?

Colonel LOCKWOOD. Do you mean now?

Mr. LITTLEFIELD. Not right this minute. I understand that is the suggestion of the chairman.

Colonel LOCKWOOD. The foundation as fixed is 25 feet in diameter, 40 feet above the water. That stops the whole affair right there.

Mr. LITTLEFIELD. Suppose you say it ought not to be there, and that then the bill is accommodated to your suggestion.

Mr. ESCH. In other words, could you amend this bill to comply with your suggestions?

Colonel LOCKWOOD. Only so far as the superstructure is concerned.

Mr. SHACKLEFORD. I suppose that is the purpose of the bill. The gentleman proposes to put this up with his own money, and if it is not substantial and suitable I understand he is to lose his money. The

only thing it seems now the committee has asked for is, Can you specify what should be contained in the light-house for its operation—the upper portion of it?

Colonel LOCKWOOD. It can be done. The whole subject is discussed in this annual report of 1890, when General Casey and General Craighill stated what was deemed essential in a light-house at that locality.

The CHAIRMAN. Will you put your views, or the views of the Light-House Board, in a paper that will remain in your hands, that can be referred to in this act, that will give what you regard as essential to a complete light-house there, eliminating this matter of foundation and of permanency—just the structure, commencing, say, 20 or 30 feet above the water?

Mr. SHACKLEFORD. Do you mean structure or equipment?

The CHAIRMAN. Structure and equipment—and all.

Mr. LITTLEFIELD. What he needs for room——

The CHAIRMAN. What you need for rooms, what you need for the staircase, what you need for the lenses, and lights, and everything of that kind; boats, and all those things. Put all of those things in the nature of specifications in this paper that is to be referred to in the bill.

Colonel LOCKWOOD. There would be no objection to that.

The CHAIRMAN. Will you please do that?

Colonel LOCKWOOD. I will bring it up to the Board on Monday.

Mr. WANGER. Can you spare that copy of the report?

Colonel LOCKWOOD. Yes, sir.

Mr. WANGER. Will you hand it to the stenographer, with reference to the page where the plan as to the light-house for this particular place will be found? (See Appendix.)

I would like to ask you a question with reference to the caisson which sunk in 1890. You say it sunk 15 feet of its own weight?

Colonel LOCKWOOD. I believe that is the record.

Mr. WANGER. Was it before or after the sinking to that depth that there was a washout beneath?

Colonel LOCKWOOD. It commenced at once. As soon as the caisson grounded the sand commenced to cut away on one side, and it sank down. One side of it was 7 feet higher than the other.

Mr. BURKE. How many feet higher?

Colonel LOCKWOOD. Seven. It was out of level that much.

Mr. LITTLEFIELD. This work has been with the operation of the seas and its own weight? It was undertaken to be put down in a scientific manner?

Colonel LOCKWOOD. Oh, yes——

The CHAIRMAN. What was the size of that caisson?

Colonel LOCKWOOD. Fifty-four feet in diameter at the bottom.

The CHAIRMAN. Straight sides?

Colonel LOCKWOOD. Yes, sir. It was drawn in to 45 feet in diameter 15 feet above bottom and continued at that width up to 30 feet above water.

The CHAIRMAN. We would like to have you gentlemen here on next Friday, if you please. If you will bring this matter up to the Board as early as you can and give us the benefit of this paper, we will be very glad.

Mr. MANN. Has your subsequent experience, since the adoption of

those rules of General Casey and General Craighill, shown that there should be no change of those rules?

Colonel LOCKWOOD. No change has been made.

Mr. WANGER. Was there any report of the experiment of 1890 or thereabouts?

Colonel LOCKWOOD. That was entirely a matter with the contractor. He was to sink that, and if it did not go he did not get any money. They have been suing the Government or trying to get a payment ever since.

Mr. WANGER. There was no report made about that.

Colonel LOCKWOOD. It is in the annual report of 1891 or 1892.

Mr. WANGER. Will you look that up and see what it was?

Colonel LOCKWOOD. Yes, sir.

Thereupon the committee adjourned.

APPENDIX.

DIAMOND SHOAL LIGHT-HOUSE.

General specifications published with the call to build Diamond Shoal light-house.

THE SITE.

The Diamond Shoals, which lie in the Atlantic southeasterly of Cape Hatteras, North Carolina, are shown on charts Nos. 145 and 10 of the United States Coast and Geodetic Survey. A copy of portion of chart No. 145, showing the shoals and the approximate position of the site on which the structure is to be built, is hereto attached.

The locality is one of the most exposed on the coast. According to the latest survey, the site has 24 feet of water over it at low tide; the rise and fall of the tides at the site is about 1½ feet; the current velocity has been estimated at 4 knots per hour after heavy gales, and the surface of the shoals at and in the vicinity of the site is composed of fine gray sand with broken shells.

As these characteristics of the site are more or less subjected to changes, it is to be understood that the contractor is not to base any claim or found any complaint against the United States upon any alleged discrepancy between the conditions and all the characteristics of the site as above described and as shown by the charts and the actual condition in which he finds it, nor upon any omission of information in the foregoing description, but that he is expected to visit the site, inspect the same, and make all necessary surveys, soundings, and borings for his own information.

THE LIGHT TOWER.

NOTE.—Designs for the screw-pile foundations or skeleton structures submitted to the Light-House Board will not be considered.

The tower is to be an inclosed structure, which must stand vertically and have sufficient capacity for the different rooms specified below. It is to be 150 feet high from low-water mark to the focal plane of the lantern forming the apex of the structure.

The foundation of the tower must be solid and massive to withstand the impact of the waves. Its base must be sunk to a stratum underlying the surface of the shoal which offers sufficient resistance to the weight of the structure, and should this stratum consist of material which can be scoured or displaced by the sea it must be deep enough below the latter to be out of all possible reach of the destructive action of the water.

The site all around the structure is to be protected by riprap packing composed of granite blocks weighing not less than 2 tons (4,480 pounds) apiece. The slope line of the packing must intersect the foundation at low-water mark and the original surface of the site at a distance of 40 feet from the structure.

The first floor of the structure is to be at least 30 feet above high-water mark. It is to be accessible from the water by a strong iron ladder and must be large enough

for the storage of 30 tons of coal, 6 cords of wood, 8,000 gallons of fresh water, and 3 lifeboats of 25 feet, 20 feet, and 18 feet in length, respectively. It is to be provided with a hoisting arrangement, suitable for handling boats or a load of 2 tons to be taken from the deck of a vessel anchored at a distance of 20 feet from the structure. The hoisting arrangement is to be so constructed that the parts used on the outside of the tower may be readily withdrawn into the interior of the structure and so that it may be operated either by hand or steam power, the boiler for the latter to be located on the second floor.

To gain the largest possible floor space in the first story for operating the machinery and for the handling of the material to be hoisted, the fuel and water may be stored in a centrally located vault provided in the mass of the foundation, and the boats may be hung under the ceiling.

On the second floor the fog-signal apparatus, the boiler and feed-water heater for the hoisting engine is to be located. There must be ample space for operating the machinery, and there must be provided a bin large enough to contain 1 ton of coal, a work bench, and closets for the storage of all necessary tools. A steam pump for feeding the boiler and for filling the salt-water tank on the third floor is to be located in a shaft to be provided for this purpose in the mass of the foundation.

The third floor is to have a fire-proof vault for the storage of 460 cases of mineral oil, each case measuring 12½ by 12½ by 14½ inches high. The vault is to have double iron doors, the outer to be air-tight; automatic ventilators, which close in case the oil should take fire; and a drain from its basin-shaped floor leading into the sewer pipe, through which the oil can run off in case of accident. The third floor must also be provided with salt-water tanks having a total capacity of 1,600 gallons, and the remaining space is to be utilized for the storage of one year's provisions for four men, for which all necessary shelving and closets are to be provided.

The fourth and fifth floors are to be used for bedrooms. Each floor is to have two separate rooms, each large enough to contain the necessary furniture (bed, bureau, table, and two chairs) and one closet.

The sixth floor is to be utilized for a kitchen, containing a pantry and closets for storing all necessary cooking utensils and table furniture.

On the seventh floor is to be the sitting room; it is to have fresh-water tanks of a total capacity of 1,600 gallons and two closets.

The eighth floor, which is to be immediately below the main gallery of the tower, is to be used for the service room; it is to be fitted up like the sitting room, and must contain two closets.

The main gallery of the structure must have an area of at least 360 square feet; it supports the watch room and the lantern, which are to be similar in construction to those adopted by the Board.

The choice of the various kinds of materials to be used in the construction of the tower is to be left to the designer and contractor. The building, the different floors, and the stairways must be entirely fireproof, and lights of the latter are to be so arranged that fire originating on any floor can not be communicated by them to the others. The first, second, and third floors are to be covered with fireproof material, and excepting the first floor are to have trap-door openings to permit the stores to be hoisted on the third floor. The remaining floors, except the iron watch-room floor, are to be covered with wood.

All door frames of the structure exposed to the weather are to be made of iron; the doors are to be double, the outer ones to be made of iron.

The rooms are all to be well lighted; the iron window frames are to have double sashes, without exception.

The rain falling upon the main gallery of the tower is to be conducted into the fresh-water tanks on the seventh floor. The overflow of these tanks is to be conducted into the large fresh-water tanks or cisterns on or below the first floor, which overflow into the sea. The water to be used in the kitchen is to be piped from the floor above to the sink.

The sewer pipe, which has its upper end at the sink in the kitchen, passes through the structure and its foundation and leads into the sea. It is to have trapped cesspool branches from the first, second, and third floors and from the oil vault, and must be properly ventilated.

The pipe supplying the first, second, and third floors with salt water from the tank in the third story terminates in the water-closet on the first floor, from which a separate sewer pipe is to lead into the sea.

All pipe branches, except those embedded in the mass of the foundation, are to be so arranged that they can be replaced and renewed without destroying any portion of the building.

The brick chimney of the structure must be large enough in cross section to carry *off the smo*ke from all furnaces on the second floor, from the kitchen stove, and

heating stoves in the sitting and service rooms. It is to be continued above the main gallery by a copper pipe, which terminates above the highest part of the lantern. The copper pipe is to be located on the west side of the lantern, and is to be surrounded up to the level of the lantern gallery by a cast-iron pipe, the air space between the two forming a nonconductor of heat.

Fresh and foul air ducts are to be provided throughout the whole building, to enable the keeper to ventilate each and every room of the structure without opening the doors or windows.

The contract for the structure will also include the furnishing and putting in place of every article required to fully and completely equip the light tower for service, viz, carpets, furniture, bedding, linen, cooking utensils, table furniture, stoves, electric bells, a full set of carpenter's and machinist's tools, the three boats complete with oars, sails, and all necessary fittings, life-preservers, a set of flags, the ropes for the hoisting arrangement, tackles, etc.

The contractor must obtain from the United States Government at the light-house depot at Staten Island, N. Y., the fog-signal machinery, the lenticular apparatus, including lamps, oil, and all necessary articles required for the exhibition of the light, such articles to be furnished him at cost. The contractor will be required to transport them to the site and have them erected there under the supervision of an agent of the Light-House Board.

An inspector employed by the Light-House Board will inspect all material and workmanship, and any part of either which is not in accordance with the specifications must be promptly and satisfactorily replaced by the contractor.

The contractor will have to furnish the inspector with satisfactory board and lodging, and must transport him to and from the site whenever the agent deems such transportation necessary; board, lodging, and transportation to be without extra charge either to the inspector or the United States Government.

After the light tower has been entirely completed the contractor will be required to maintain the light station in strict accordance with the regulations of the Light-House Service for a period of one year. Should, at the expiration of this time, the agreements between the contractor and the United States Government have been carried out to the entire satisfaction of the Light-House Board the light station will be accepted and paid for.

The bid is to be accompanied with a full set of drawings, a complete set of specifications, including a full description of the method of sinking the foundation, and a complete descriptive list of every article to be furnished. The plans, drawings, and specifications to be subject to the approval of the Light-House Board.

COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE,
Friday, January 29, 1904.

The committee met at 10.30 o'clock a. m., Hon. William P. Hepburn in the chair.

STATEMENT OF LIEUT. COL. DANIEL W. LOCKWOOD, U. S. ARMY, ENGINEER SECRETARY OF THE LIGHT-HOUSE BOARD.

The CHAIRMAN. Does this paper which you have handed me contain the views of the Light-House Board with reference to the equipment of the the light-house structure at Diamond Shoals above the foundation?

Colonel LOCKWOOD. It refers to the room that is deemed essential. The equipment is the furnishing. But this is for the part above water to carry the light and the rooms for storage and living purposes.

The CHAIRMAN. You say, first, the tower above the foundation of the cylinder should be an inclosed structure of cast iron or sheet-steel plates securely fastened together, of sufficient capacity to accommodate the rooms mentioned below; that the tower should be brick lined from top to bottom, with an air space between the outside shell and the brick lining for purposes of insulation and sanitation.

What do you mean by that—"The tower above the foundation of the cylinder?"

Colonel LOCKWOOD. Enough space to contain the rooms that is designated later.

The CHAIRMAN. You do not mean this other structure for this spiral stairway that you spoke of the other day when you were here?

Colonel LOCKWOOD. Oh, no. The object of lining the tower with brick is to prevent the sweating that takes place in iron or steel structures, and, as stated there, for general purposes of sanitation; and the separation from the casing is so as to prevent any cracking or breaking of that lining by the vibration of the tower or the expansion or contraction of it by heat and cold.

The CHAIRMAN. How long at a time would the keepers be isolated there?

Colonel LOCKWOOD. The general practice in cases of that kind is to limit their tour to three months at a time.

The CHAIRMAN. Do you mean to say that there would be three months at a time when the men on there could not go to land?

Colonel LOCKWOOD. They can not go to land unless they are provided with boats.

The CHAIRMAN. Of course; but suppose they have the boats.

Colonel LOCKWOOD. They can get ashore then at times; there is no question about that.

The CHAIRMAN. What is the longest period known to you where it would have been impracticable for them, being equipped with boats, to get to the shore?

Colonel LOCKWOOD. I have no means of knowing; I do not know anything at all about that. The only point is in the distance to the nearest place they could land under ordinary circumstances—from 15 to 18 miles. That is Hatteras Inlet, and in a report I have seen the reason why stanch and large boats are provided; it is because storms are liable to come up even in the time that would be required to go from Hatteras Inlet to the light and back, and there must be a place at each end which they could get in with certainty.

The CHAIRMAN. How many men would constitute the keeper's party resident in this light-house?

Colonel LOCKWOOD. Four men.

The CHAIRMAN. They would be there continuously?

Colonel LOCKWOOD. Yes, sir; there would be four men there practically all the time.

Mr. ESCH. In point of altitude, how high would you brick it?

Mr. SHACKLEFORD. The lining.

Colonel LOCKWOOD. Just as far as the rooms go.

Mr. ESCH. Can you give us any idea how much that would be?

Colonel LOCKWOOD. In the Anderson & Barr tower it provided that the lining should go up for eight stories.

Mr. ESCH. And how much to a story?

Colonel LOCKWOOD. I think 11 feet 6 inches.

Mr. ESCH. So there would be pretty near 100 feet of lining?

Colonel LOCKWOOD. Yes.

Mr. ESCH. Would that add anything to the strength of the steel tower?

Colonel LOCKWOOD. Oh, no; it was not designed with that object in view at all. The specifications required that the brick lining should *carry the weight* of the floors, however—the original specifications.

Mr. ESCH. Then your brick lining is laid upon an end structure; it deepens with the foundation?

Colonel LOCKWOOD. Yes.

Mr. ESCH. And the stories and all the contents rest upon the foundations, and would not be a burden on the tower?

Colonel LOCKWOOD. That is the point.

Mr. ESCH. You say that there should be a safe inlet for these boats coming to the tower, at least a space for quiet water. Would it be possible to take up the boats by derricks as they do at some light-houses—for instance, they do so near San Francisco?

Colonel LOCKWOOD. Take them up high enough, you mean?

Mr. ESCH. Lift them out of the water and launch them from the derricks?

Colonel LOCKWOOD. The arrangement in the Anderson & Barr light-house was to hoist them up and take them inside of the light on the lower floor and store the boats in there, up against the roof, to give that additional room.

Mr. ESCH. Then they could be raised out of the sea, could they not?

Colonel LOCKWOOD. Yes; that is quite enough, so they could get to the tower.

Mr. BURKE. Would it not be as feasible to land at the light-house as it would for a pilot to get on a ship coming in?

Colonel LOCKWOOD. I have no knowledge about pilots landing there. I would suppose that the shape of the tower certainly might make it more difficult. I could not say as to that. That is practically something I know nothing about.

The CHAIRMAN. This paper was prepared with reference to the structure that was contemplated and authorized by law a number of years ago, was it?

Colonel LOCKWOOD. Yes, sir. Those specifications that I have given you there, sir, are some that were prepared, as stated before, by General Casey and General Cragin and Colonel Gregory.

The CHAIRMAN. Perhaps I had better read these.

THE LIGHT TOWER ABOVE FOUNDATION CYLINDER.

(1) The tower above the foundation cylinder should be an inclosed structure of cast-iron or sheet-steel plates securely fastened together, of sufficient capacity to accommodate the rooms mentioned below. The tower should be brick-lined from top to bottom with an air space between the outside shell and the brick lining for purposes of insulation and sanitation.

(2) The first floor of the structure should be at least 30 feet above high-water mark, to be readily reached by a strong, easy ladder. It should accommodate 20 tons of coal, 5 cords of wood, 8,000 gallons fresh water, and 3 lifeboats of 18, 20, and 25 feet length, respectively, the 25-foot boat to be a strong, petroleum-power launch. It should contain the hoisting arrangement for handling the boats, or a load of 2 tons, at a distance of 20 feet from side of the structure; the hoisting arrangement to be arranged so as to be withdrawn inside this compartment and worked either by hand or power. The clear inside diameter of this room should suit the boats, say 30 feet, and its height, in clear, about 12 feet. A water-closet must be located on this floor.

(3) The second floor should be at least 25 feet in diameter in the clear and about 12 feet high. It should contain the fog-signal apparatus in duplicate, consisting of 2 Hornsby-Akroyd petroleum engines with air compressors, air tanks, trumpets, machinery, piping, etc.; also a petroleum engine for operating the boat hoist on floor below, workbench, and closets for tools. A power pump, to connect with hoisting engine, for raising salt water to a tank on third floor, should be located at a convenient point either on the first or second floors.

The third floor should be about 22 feet in diameter in the clear and 11 feet high.

It must contain a fireproof vault for the storage of about 800 cases of mineral oil, each case 12½ by 12½ by 14½ inches. The vault must have double iron doors, the outer one to be air-tight; automatic ventilators, which close in case oil takes fire, and a drain from the basin-shaped floor of the vault should lead overboard to carry off oil in case of accident.

The salt-water tanks should contain about 1,600 gallons total, and the remaining space, provided with shelving and closets, will be utilized for storage of one year's provisions for four men.

(4) Above these three floors just mentioned four bedrooms, each large enough to contain the necessary furniture for each one of the four keepers, should be provided. A kitchen containing a pantry and closets for storing all necessary cooking utensils and table furniture, and a sitting room for the keepers, in which can be placed the fresh-water tanks of a total capacity of 1,600 gallons, and two closets should be placed above the bedrooms.

(5) In all skeleton structures constructed by the Board since 1852 to the present day, in which the stairs are carried in a tube of sheet iron or cast iron, the tube has been rigidly braced on all sides; its diameter has never been less than 6 feet, and preferably 8 to 9 feet. The stairs should be of easy rise and broad tread throughout the structure.

(6) A service room should be located near the top and immediately below the main gallery, carrying or supporting the watch room and lantern. It is to be fitted up like the sitting room, and contains all closets, furniture, supplies, and appliances for the immediate care and working of the light.

(7) The main gallery mentioned above should have an area of at least 360 square feet and should support the watch room and lantern, which must conform to the type in general use in the Light-House Service.

(8) The watch room should be about 14 feet 9 inches inside diameter; its height about 8½ feet in the clear. The lantern is about 12 feet 6 inches diameter outside, 11 feet 9 inches diameter inside, and the clear glazed opening through which the light passes about 9 feet 9 inches. The height of the focal plane, or center of flame, above the watch-room floor, is about 13 feet 6 inches. The helical-bar lantern must be of composition, and must be furnished and erected by the contractor.

IN GENERAL.

(9) The choice of the materials used in the construction of the tower to be left to the designer. The tower, the floors, and stairways should be fireproof, and the latter are to be so arranged that they will not communicate fire from one floor to another. The first three floors are to be covered with fireproof material, and the second and third floors provided with trap-door openings. The other floors, except the iron watch-room floor, are to be covered with wood. They should be strongly built.

(10) All door frames exposed to the weather should be of iron; the doors to be double and the outer ones to be of iron.

(11) All the rooms should be well lighted. The iron window frames are to be provided, without exception, with double sashes and iron water-tight shutters on the outside.

(12) Rain water from the main gallery must flow into the fresh-water tanks in the sitting room, the overflow from these tanks to be conducted into the fresh-water tanks below the first floor, which overflow into the sea. The water used in the kitchen is to be brought from the sitting-room tanks to the sink.

(13) The sewer pipe leads from kitchen sink through the structure and foundation into the sea. It should have trapped cesspool branches from first, second, and third floors and from the oil vault, and must be properly ventilated.

(14) The pipe supplying the first, second, and third floors with salt water from the tanks in the third story terminate in the water-closet on the first floor, from which a separate sewer pipe should lead into the sea.

(15) All pipe branches except those imbedded in the foundation are to be arranged to be renewed when necessary without impairing the structure.

(16) The brick chimney must be large enough to carry off the smoke from the kitchen stove and the heating stoves of the sitting and service rooms and must be continued above the structure by a copper pipe terminating above the highest part of the lantern. It should be located on the west side of the lantern and surrounded up to the level of the lantern-gallery by a cast-iron pipe, the air space between them for insulation.

(17) Fresh and foul air ducts should be provided throughout the whole structure to ventilate each and every room without opening doors or windows.

(18) The fog-signal machinery, lens apparatus, and lamps for lens will be furnished by the United States to the contractor on the wharf at the general light-house depot on Staten Island.

Mr. BURKE. Does this differ materially from the specifications of the light-house mentioned in this bill, so that you can tell——

The CHAIRMAN. No. I do not know that there are specifications here, but it seeems to me that if we went into this matter, this arrangement, this part of the structure ought to be controlled by the Light-House Board, as they are the fittest persons to tell about that, and that is why I asked the colonel last Tuesday if he would prepare a paper. My idea would be that you could prepare a paper that would be referred to in this bill as containing all these necessary requirements as you might find them.

Mr. SHACKLEFORD. In that connection, he said something about a lining there, and the vibration of this tube. I desire to ask whether that could not be one tube within another, to prevent sweating, rather than have brick?

Colonel LOCKWOOD. I do not think it would answer.

Mr. SHACKLEFORD. It is an exception to the rule, and I thought maybe if there was an air space between the inner tube and the outer tube it would prevent the sweating.

Colonel LOCKWOOD. That is a detail which could be best decided by people who live in these structures.

Mr. SHACKLEFORD. Wherever there is an intervening air space it prevents the sweating. A familiar illustration is what you see on the railroad-car windows. If there is only one window, in a short time you are not able to see out at all; but take the double windows of the Pullman sleeping car and you are able to see clearly through the glass. That air space prevents the sweating.

Colonel LOCKWOOD. But two metal tubes would hardly stop that, because the condensation would still be on the inside of the inner tube or between the two. That method of a small air space has been tried in preventing sweating in fortifications.

Mr. LOVERING. Is it your idea that this brick tubing inside should be self-supporting?

Colonel LOCKWOOD. Practically.

Mr. LOVERING. Or in any way attached to the outer cylinder?

Colonel LOCKWOOD. In the specifications, sir, that have just been read by the chairman, the lining was to be self-supporting.

Mr. LOVERING. What, in your judgment, would be the vibration of a light-house of that kind from heat and cold in summer and winter?

Colonel LOCKWOOD. I could not tell you that. That is rather an obscure problem.

Mr. LOVERING. Would it be sufficient to affect the brick work at all?

Colonel LOCKWOOD. It was deemed so, sir; or else the specifications would not have read that way.

The CHAIRMAN. You probably do not get the meaning of the gentleman's question exactly. Will you not ask that question again?

Mr. LOVERING. I say, would the vibration, owing to the sun being on one side and on the other at different times of the day, be sufficient to make the tube affect the brick work—the inner tube?

Colonel LOCKWOOD. If it was right against it it would.

Mr. LOVERING. Would it be sufficient?

Colonel LOCKWOOD. I think beyond a doubt it would. The coefficients of expansion of brick and iron are very different——

Mr. SHACKLEFORD. How much intervening space ought there to be between the brick and the steel tube?

Colonel LOCKWOOD. That need be but small; I forget how much

was prescribed in the other case. But there is another feature there. The vibration of this tube from the wind and sea is, in my opinion, greater than the expansion from heat and contraction from cold.

Mr. LOVERING. The vibration of the Eiffel Tower, which is 1,000 feet high, is something like 15 inches.

The CHAIRMAN. I remember seeing a statement of the effect of the wind on the Monadnock Building, in Chicago, which is 18 stories high, I think. It said the vibration there was a small fraction above a half an inch. That is a brick building.

Mr. RICHARDSON. Is not this light-house that we are talking about now in the nature of an anchored ship, built in the same way, of steel pretty largely, and did you ever hear of all these bricks that you require in these specifications to be used, did you ever hear of them being used in the construction of different portions of a ship?

Colonel LOCKWOOD. No, sir.

Mr. RICHARDSON. Do you think the brick you are speaking of here in these specifications are really necessary to give any strength to the tower?

Colonel LOCKWOOD. They add strength in this way: They increase the weight and therefore increase the moment of resistance against overturning. That was one feature that is important in this case. And then the other is to make the place as healthy as possible. A ship is a complete institution by itself; they can attend to all those matters with very little trouble compared with a building of this kind.

The CHAIRMAN. Is there not some substitute that could be used, something very much lighter and more easily used in that particular place than brick?

Colonel LOCKWOOD. Possibly, but it probably would not be able to carry the weight of the floor.

The CHAIRMAN. How is that?

Colonel LOCKWOOD. I say there is no doubt some lighter substance than brick that could be used, but then it would not be able to carry the weight of the floors.

Mr. LOVERING. Suppose it was an inner tube and a stuffing between?

Mr. SHACKLEFORD. You would not want the stuffing between; leave it without any stuffing, put one tube inside the other, anchoring one to the other at intervals to brace them.

Colonel LOCKWOOD. The idea in putting brick in there is because it is such a poor conductor of heat.

Mr. LOVERING. That is just my point. I thought iron being susceptible to heat, and brick not being susceptible to heat, the heat might throw it over to an impact with the brick.

Colonel LOCKWOOD. That matter was carefully thought out.

Mr. SHACKLEFORD. The principal purpose of this lining, as I understand, is to prevent the precipitation of water on the walls by condensation.

Mr. LOVERING. That could be done——

The CHAIRMAN. This would be a minor matter, after all, would it not, this matter of the lining?

Colonel LOCKWOOD. Well, as to the exact nature of the material, yes; unless the carrying of the floors was regarded as a vital point.

Mr. WANGER. You think the floors ought to be carried by the brick, do you, and not by the outside iron frame?

Colonel LOCKWOOD. Yes; that is the idea.

The CHAIRMAN. That would, after all, be an element of construction as to the safety and permanence of the structure that would interest more particularly the builder. What I wanted you to give us, if you would, are the essentials to the comfort of the men, the essentials to the operation of lights, and to its general efficiency as an aid to navigation, without so much reference to the structure as it bore upon permanence.

Colonel LOCKWOOD. Well, that is what I have aimed to do in that, Colonel. Will you allow me to make one suggestion?

The CHAIRMAN. We will be glad to have you make any. We want you to help us as far as you will.

Colonel LOCKWOOD. In the original bill for the Pollock Rip Shoal light it was provided that when the foundation and space of the structure should be completed all work and construction and work above the same should correspond to plans to be approved by the Secretary of the Treasury. Now, it is provided later on in this present bill that the work shall be inspected from time to time by the War Department. It would be perfectly proper to have the War Department pass on those plans, it seems to me, and with regard to that inspection the present bill says that "said Eells shall make his own plans for the construction herein provided for." I would suggest striking that out and putting in this clause that was in the original bill, and put in the Secretary of War instead of the Secretary of the Treasury or the Secretary of Commerce and Labor. Then it says:

During the progress of construction of said light-house the same shall be inspected from time to time under the direction of the Secretary of War.

That practically amounts to no inspection at all unless it is provided that the inspectors shall be on the work all the time, and there is no provision made for that.

Mr. STEVENS. Is there any provision for penalties in case the inspection under the original bill discloses what the inspector thinks are false?

Colonel LOCKWOOD. What bill do you mean?

Mr. STEVENS. The original bill before the committee. Suppose an inspection is made and faults are found, what right has the inspector in the way of enforcing any penalties?

Colonel LOCKWOOD. He has not any. It says during the progress of the construction of the said light-house the same shall be inspected from time to time.

Mr. STEVENS. Without any right to change anything or condemn anything?

Colonel LOCKWOOD. No, sir.

The CHAIRMAN. I suppose that the reason for that omission was that these parties themselves assumed all the responsibility, and there was the five-year period of testing the sufficiency and efficiency of the structure.

Mr. SHACKLEFORD. Are you not mistaken about that; does not the bill itself provide that this structure shall come up to certain requirements, and in certain particulars it requires what it shall be, how deep in the sea, how deep the foundation shall be, and so on, and would not the inspector have to inspect and see if the builder was complying with the terms of this bill? Would not there be ample authority there for the inspector to say, "You are not complying with the terms of the bill, your foundation is not as deep into the sea as the specifications

provide," or "Your timber is not such as the specifications and the bill provide," and would there not be many things that the inspector might observe and deem as not complying with this bill?

Mr. TOWNSEND. Suppose he should, what then; suppose he should condemn it. He might find any fault he wanted to, and still there is no penalty.

Mr. SHACKLEFORD. Yes; unless he complies with this bill he gets no compensation.

Mr. TOWNSEND. Is that in the bill?

Mr. SHACKLEFORD. That is in the bill. It is a condition precedent to his receiving any compensation that he shall complete a structure of a certain kind and that it must comply with the provisions of this bill. That is a condition precedent to his receiving any compensation whatever, and all the conditions precedent are put in the bill.

The CHAIRMAN. But suppose, now, Mr. Shackleford, that he builds a structure there that is only 14 feet in the sand, but it stands the test and at the end of five years it is there serving all the purposes of a light-house; he would certainly demand his pay.

Mr. SHACKLEFORD. Would he not be entitled to his pay?

The CHAIRMAN. I do not know but what he would.

Mr. SHACKLEFORD. If the provisions of the bill require that he shall go down 16 feet——

The CHAIRMAN. There are some broader provisions in the bill——

Mr. KYLE. Either 15 feet, or so far as shall be necessary. Who is going to determine that?

Mr. ADAMSON. You read from the specifications there. Will that one stand on a 70-foot-diameter base?

Colonel LOCKWOOD. Those are the specifications for the Anderson & Barr contract twelve years ago.

Mr. ADAMSON. Suppose you wanted to make another just that size or similar, would a 70-foot-diameter base be sufficient to build such a one on?

Colonel LOCKWOOD. Yes; if we went down far enough.

Mr. ADAMSON. It is wide enough?

Colonel LOCKWOOD. Yes; the other was only 54 feet.

I have here the report of the district engineer with regard to what was reported to him concerning the sinking of the Anderson & Barr caisson, and an interview in the Engineering News with Mr. Anderson. I made a mistake the other day when I said the caisson sank 15 feet of its own weight. That would convey the impression that it did it at once. From what I can gather from these reports it went down 10 feet and then slowly settled of its own weight until it had gone down even more than 15 feet. Mr. Anderson says:

The caisson could not be built up fast enough to meet this settlement, and the support expected from the shoal was not there, and therefore the caisson was abandoned on account of rough weather and the boats were withdrawn.

I have these papers explaining this in full——

The CHAIRMAN. Will you give them to the stenographer?

Colonel Lockwood submitted the following:

FOOTNOTE.—The following extract from the Engineering News of July 25, 1891, tells the story of the loss of the caisson:

"The Diamond Shoal caisson was lost in a storm off Hatteras, as intimated in our last issue, and it is beyond recovery. Mr. Anderson, of Anderson & Barr, the contractors for this caisson, gives the following particulars: The caisson was 50 feet high and 54 feet in diameter, with four 9-foot dredging tubes inside. It was successfully

towed from Norfolk, Va., and reached the shoal, 9 miles out from Cape Hatteras, on July 1, and 3 vessels loaded with cement, etc., for concrete were anchored near by. The sea was unusually quiet and quite favorable, and the caisson was easily located and dropped to the bottom in water from 22 to 25 feet deep. It was about 3 feet out of level, but was righted in a few hours by dredging. But the eddies and currents were so strong that next morning it was 9 feet out of level again, and the sand was washed away so rapidly by the strong bottom currents that in a few days the caisson had sunk so as to leave only 6 feet above the water.

"The caisson could not be built up fast enough to meet this settlement, and the support expected from the shoal was not there, and on July 4 the caisson was abandoned on account of rough weather and the boats were withdrawn. The chief cause of trouble lay in the charts made by the Government in 1871. These showed 8 to 12 feet of water on the shoal. Since that date the shoal had changed as above outlined, and it is shifting rapidly still. Mr. Anderson said that the caisson was handled with ease, but that he now proposes to seek authority to construct a riprap breakwater at another point near by to break the force of the waves and then sink a caisson of greater base and longer to start with. All the machinery for dredging was swept away in the storm and several feet of the top of the tube were broken off by the force of the waves. No attempt will be made to recover the old caisson."

Report of operations, fifth engineer, July 1, 1891.

456. Outer Diamond Shoal Light Station, North Carolina.—The contractors for constructing new light-house arrived at the site on the morning of July 1, and anchored the caisson at 9.30 o'clock a. m. The caisson sunk of its own weight about 10 feet in the sand bottom, but much trouble was experienced in keeping it in an upright position. Some dredging was done on the land side of the structure, and a cargo of concrete in bags was thrown out on the sea side, which served only as a temporary relief in preventing the action of the sea from scouring the sand from the front of the work.

A severe northeast gale set in on the 8th of the month, lasting until the 11th, which resulted in breaking off a portion of the cast-iron plates, throwing the engine, boiler, hoisting and dredging apparatus into the cylinder and damaging the caisson to such an extent that the work was abandoned.

OFFICE OF U. S. LIGHT-HOUSE ENGINEER,
FIFTH AND SIXTH DISTRICTS,
Baltimore, Md., August 10, 1891.

MY DEAR MAHAN: The following are the principal facts relating to the loss of the Diamond Shoal caisson as far as I am informed:

The caisson was 54 feet in diameter for a height of 30 feet above the cutting edge; it was then conical for a height of 15 feet, making the total height 45 feet. The tops of the dredging tubes were 5 feet higher and supported the platform that held the dredging and hoisting machinery.

The caisson reached the site on the morning of July 1 and was grounded in water from 22 to 25 feet in depth.

The scour caused the caisson to sink out of level, and at one time one side was 7½ feet higher than the opposite one. The caisson was nearly restored to a vertical position by dredging.

An attempt to stop the scour by using concrete in bags failed and the caisson soon sank about 10 feet, and continued to sink, until the morning of July 4 it was only 5 or 6 feet out of water. The first vessel with material arrived on the afternoon of July 3. Up to July 4 no work had been done on the caisson, except that connected with making it vertical. On July 4 the contractors commenced work on the caisson, but the sea soon stopped all work and the vessels left the site, and no attempt to work was made after July 4, when the contractor left the site to obtain a boiler in which salt water could be used. The storm of July 8 carried away the machinery, one dredging tube, and the upper portion of the caisson, so that only three dredging tubes remained above the water.

I return herewith the clipping from Engineering News.

Sincerely yours, J. C. MALLERY.

Colonel LOCKWOOD (continuing). This bill provides that the United States shall provide the equipment for the said light-house and fog signal. That adds to the cost of the light to the Government something like $30,000. It is not stated here who is to put those things up. That should be definitely settled. And the character of the lantern is not settled. An ordinary iron or steel lantern would cost about one-half of what a composition metal lantern would cost, or something like $6,000 or $7,000, or possibly $8,000. A composition lantern such as is used on the seacoast in an exposed place like that out in the water costs about $12,000.

In the original contract with Anderson & Barr the estimate of the entire cost of that structure, without any profit, was $390,000. That was the estimated cost of the whole affair, they paying everything, paying for the lanterns and the entire equipment, the Government only furnishing the lens and the fog signal apparatus to them on the dock at Staten Island.

It included also $42,000 for riprap around the foundations. The cost of their tower—the estimated cost if they had sunk it without any accident—was $236,000, and it was twice the size of this one—more than that.

Mr. STEVENS. In height or in diameter?

Colonel LOCKWOOD. This one is to be 70 feet in diameter at the base and 27½ feet at the top, and it is to be 65 feet high. The Anderson & Barr caisson was 54 feet in diameter at the bottom, 45 feet at the top, and it was 155 feet high—or 135 feet high, depending on the way they had to sink it. That was estimated to cost $236,000.

The CHAIRMAN. Was that to be filled with concrete?

Colonel LOCKWOOD. Yes, sir. It was the regular type of caisson with a bottom and four dredging openings 9 feet in diameter left for getting sand up out of the bottom.

Mr. BURKE. Do I understand that that estimate included the cost of the whole structure?

Colonel LOCKWOOD. No; $236,000 was the cost of the caisson up to the superstructure in place, and the entire cost of the structure without any percentage of profit was $390,000. And that provided for a superstructure like the one read by the chairman, and this extensive pier or foundation.

Mr. BURKE. And the inner lining of brick?

Colonel LOCKWOOD. Oh, yes. And this paid for the lens and the equipment of the whole superstructure. The Government did not have to pay out a cent except for inspection. Four hundred and eighty-five thousand dollars was the entire cost to the Government, and that included a year's operation and the maintenance by Anderson & Barr, and interest on their investment for four, three, two, and one years. That was in connection with the building.

Mr. RICHARDSON. And what is your estimate now that this light-house will cost as proposed to be built by Mr. Eells?

Colonel LOCKWOOD. I can not tell, sir.

Mr. RICHARDSON. Has not the Light-House Board made an estimate?

Colonel LOCKWOOD. With this specification it would not be a guess, even.

Mr. RICHARDSON. I thought it was about $1,600,000.

Colonel LOCKWOOD. Oh, no; you mean the Board's estimates for——

Mr. RICHARDSON. Yes.

Colonel LOCKWOOD. Oh, I thought you were referring to this light-house here. That is $1,600,000.

Mr. RYAN. What sort of a structure is that?

Colonel LOCKWOOD. It provides for a breakwater and then the establishment of a shore station at Hatteras inlet, and the light-house is built inside the breakwater and was estimated to cost $300,000.

Mr. RICHARDSON. The Light-House Board recommended in the Fiftieth Congress the construction of a light—you said it was a favorable place and that it was practicable and could be done, and it was limited to $500,000.

Colonel LOCKWOOD. Yes, sir.

Mr. RICHARDSON. Now, wherein is the difference between what the Light-House Board recommended at that time and the cost of the one that Mr. Eells now proposes to put up?

Colonel LOCKWOOD. It is impossible to arrive at a fair estimate of what is proposed by Mr. Eells.

Mr. RICHARDSON. You said the Board had estimated it at $1,600,000, Eells's structure——

Colonel LOCKWOOD. Oh, no.

Several MEMBERS. Oh, no.

Mr. RYAN. That included a breakwater, a shore station, and all that kind of thing.

Mr. BURKE. The breakwater and then the light-house inside was to cost $300,000.

Mr. RYAN. The light-house itself would not cost but $300,000, he said a moment ago.

Mr. ESCH. How much would the brick lining, the air space, shorten the inner diameter?

Colonel LOCKWOOD. In the original structure the brick lining at the bottom was to be 3 feet 6 inches. You see that would cut out 6 feet.

Mr. ESCH. And not including the air space?

Colonel LOCKWOOD. Well, the air space was probably 3 inches. I do not think it was more than that; I would not be certain, though.

Mr. ESCH. That would be 6½ feet?

Colonel LOCKWOOD. Yes.

Mr. ESCH. And this requires that it shall be 27½ feet?

Colonel LOCKWOOD. Yes.

Mr. ESCH. And you say your minimum for your boats would require 30 feet?

Colonel LOCKWOOD. Yes. The Anderson & Barr plan would require that. The inner diameter of the lower floor clear was 33 feet.

Mr. ESCH. Thirty-three feet?

Colonel LOCKWOOD. Yes, sir.

Mr. RICHARDSON. Do you believe that it is practicable under the plan outlined by Mr. Eells in this bill to erect a light-house on Cape Hatteras?

Colonel LOCKWOOD. No, sir.

Mr. RICHARDSON. You do not think it is practicable?

Colonel LOCKWOOD. No, sir; I do not think it is practicable to locate a stable light-house in this way.

Mr. RICHARDSON. You would not like to see that effort made by Mr. Eells?

Colonel LOCKWOOD. No, sir.

Mr. RICHARDSON. Why; it would not cost the Government anything if it is a failure?

Colonel LOCKWOOD. Well, there is one thing to be looked forward to in this matter, sir, and that is supposing everything went on favorably and that the light was established and stayed four years. From that time up to the end of the five years, before he gets paid for it, there is a divided responsibility. The Light-House Board is then operating that light, and if anything happens to it in those four years there is the foundation for a claim at once.

Mr. RICHARDSON. But you said the other day that you would retain the light-ship, even if the light-house was established?

Colonel LOCKWOOD. Yes, sir.

Mr. RICHARDSON. So you would have exactly the same responsibilities when the light-house was constructed, because you would retain the light-ship?

Colonel LOCKWOOD. Yes, sir.

Mr. RICHARDSON. Then you would have the same thing you have now with the additional advantage of the light-house?

Colonel LOCKWOOD. I am speaking about the claim against the Government that might be made, if we had a light-house there and anything happened. The Light-House Board of course will be operating it and, as I have said, there will be a divided responsibility during the five years. I maintain that the structure here proposed can not be maintained and operated as a light-house; that the structure will not carry lighting apparatus, with its accessories, that has to go to the top of it.

Mr. ESCH. In other words, you think there will have to be some structure outside the tube to strengthen it?

Colonel LOCKWOOD. If that method is adopted, and even that method of construction is undesirable here because they are always unsteady.

The CHAIRMAN. Is not this also true, that this is a matter that is entirely for him to determine? It looks to me as if the Light-House Board is simply interested in the efficiency of this sustaining, supporting of the light, and furnishing proper accommodations for the keepers. That seems to me is what the Board ought to look to, and as to the character of the structure, that is simply a matter for the contractor. He takes all of that responsibility. If he does not get a tube that stands, if his tube collapses, that is his business and it does not affect the Government, except as it may be disappointing in not giving you the light.

Mr. TOWNSEND. If it stands five years——

The CHAIRMAN. You have to take the chances. A thing that would stand five years will probably stand longer. We have fixed the time at five years because it was suggested that the very severe storms occur at intervals of not longer than five years. So if we fix the period of five years we thought we would have one of these hurricanes during that time to test the structure.

Mr. TOWNSEND. I understood the Colonel to say the other day that this experiment of Anderson & Barr was practically a condition of work where their pay depended on the work being a success.

Colonel LOCKWOOD. They never got any pay.

Mr. TOWNSEND. Has there been any trouble about it since then?

Colonel LOCKWOOD. Yes.

Mr. TOWNSEND. What?

Colonel LOCKWOOD. They presented a claim—I do not know whether they came to Congress with it or not, but they presented a claim and

urged it on the ground—as this is quite curious—that they expected to find from 8 to 12 feet of water and instead they found from 20 to 24 feet, and that was too deep for them; and this structure proposes to go out to 30 feet. There are some interesting things in the——

Mr. RICHARDSON. To whom did they present that claim?

Colonel LOCKWOOD. They lost $100,000.

Mr. RICHARDSON. They went ahead and expended $100,000, you say, which was a failure, a loss of that $100,000, and they presented a claim?

Colonel LOCKWOOD. Yes.

Mr. RICHARDSON. Against the Government?

Colonel LOCKWOOD. Yes.

Mr. SMALL. To whom did they present it?

Colonel LOCKWOOD. I do not know.

Mr. SMALL. You do not whether it ever came to Congress or was presented to any committee of Congress?

Colonel LOCKWOOD. I can send you that information as soon as I return to the office.

Mr. ESCH. I understand that it was presented to the Committee on Claims and that committee refused it.

Mr. SMALL. Probably that ended the matter.

Mr. WANGER. It probably went first to one of the Departments.

Mr. RICHARDSON. I do not understand what the basis of their claim was against the Government. You undertook to explain it, I think.

Colonel LOCKWOOD. I stated that they were led to believe from the Government chart that this structure would be put in from 8 to 12 feet of water, and when they arrived on the ground they found from 23 to 25 feet, and that led to the failure.

Mr. RICHARDSON. Was that based upon any declarations and assertions made by any of the engineers of the Government to those contractors before the contract was made?

Colonel LOCKWOOD. I do not know.

Mr. RICHARDSON. Did the Light-House Board give them any assurance or make any statements leading them to believe that the water was of such a depth before the contract was entered into?

I never heard of anything except that they claimed that the Government charts they were furnished with deceived them.

Mr. TOWNSEND. Were the specifications complied with according to the contract? It says he shall have no claim against the Government, and shall inspect the site at his own expense.

Mr. RICHARDSON. That would necessarily cut the claimant out, then?

Mr. TOWNSEND. Indefinitely cut him out from making a claim.

Mr. RICHARDSON. Oh, no; no man can be prevented from making a claim.

Mr. WANGER. This paper that was referred to in regard to the Anderson & Barr caisson, in speaking of the cause of the trouble, read:

> The chief cause of the trouble lay in the charts made by the Government in 1871. These showed 8 to 12 feet of water on the shoal. Since that date the shoal has changed as above outlined, and it is shifting rapidly still.

Are those shoals still shifting, or are they permanent?

Colonel LOCKWOOD. They are constantly shifting, but in a general sense they are permanent. They change with the changing conditions, but come back to one general condition. All the charts show that, as a general thing. They are all about as they were at first. They vary within limits.

Mr. WANGER. Do you know what those limits are?

Mr. SMALL. There is a report from the Coast and Geodetic Survey which may give information on this point, in which they say that there has been no substantial change.

Colonel LOCKWOOD. They simply vary within limits?

Mr. SMALL. In a letter dated "Office of the Coast and Geodetic Survey. Washington, March 1, 1902," it states:

> The general proposition of the outer shoal has been tolerably constant since the earliest survey in 1850, the shifting of the 5 and 6 fathom curves since 1872 being shown on the tracings above referred to. Between 1872 and 1891 there was a slight deepening at the southeast point of the shoal, as shown by the recession of the red line indicating the 5-fathom curve, while between 1891 and 1894 the reverse took place, as shown by the position of the blue curve.

If you were to put a permanent structure in there like a light-house, would the drift caused by the sea make any difference with that foundation, do you think?

Colonel LOCKWOOD. Yes; it was provided, just to anticipate that, in the original case that the old base should be riprapped about the top. The moment anything goes in there there is a scour. That is shown in the case of this Anderson & Barr case. They had the greatest difficulty in keeping it on the level. It went down 3 feet, and they straightened it up by dredging and throwing in a cargo of cement. They tried to stop the scouring in that way, but the next morning it was 9 feet out of level, as stated by Mr. Anderson.

Mr. LOVERING. Is not the agitation less at a depth of 30 feet than at 12 feet?

Mr. LOCKWOOD. It might be and then again it might not be.

Mr. LOVERING. Is the sea agitated as much 30 feet below the surface?

Colonel LOCKWOOD. No; I think not, but the information on that point is quite obscure; it is a difficult matter to tell just at how great a depth storm waves will affect the bottom; that is a very difficult matter to determine.

Mr. LOVERING. But if anybody is willing to take the risk and the Government is not in possession of any facts on the subject, what is the objection?

Colonel LOCKWOOD. The object of the Light-House Establishment is to secure a proper structure, sir, if one is going to be put up there, because the Light-House Establishment has to operate it afterwards.

Mr. LOVERING. That is all it has to do, operate it and maintain it?

Colonel LOCKWOOD. Operate it and maintain it.

Mr. LOVERING. And if it is not operated for any length of time——

Colonel LOCKWOOD. If that tower should go over and drown 4 keepers and that sort of thing, the Light-House Board would get the discredit for it. There was a great ado about Minots Ledge, you remember, when that was carried away.

Mr. LOVERING. I live on that ledge, so I know something about it.

Colonel LOCKWOOD. That went out about 1850?

Mr. LOVERING. 1851.

Mr. WANGER. Suppose this caisson was sunk to a depth of 15 feet at the time when the shoal at that point is at its highest formative condition, and that then the recession began at that place. Does the past history show that there might be a recession of 15 feet in depth, so as to take away all of the material surrounding?

Colonel LOCKWOOD. Do you ask me if that has occurred?

Mr. WANGER. Yes.

Colonel LOCKWOOD. I could not say as to that.

Mr. WANGER. Do you think it likely that it might occur? Is it possible or reasonably possible?

Colonel LOCKWOOD. It might, I think. I could not give you anything definite about that; it would be a mere guess, and I do not care to guess on those matters.

The CHAIRMAN. The action would begin at once, would it not, as soon as that caisson came in contact with the bottom of the sea there?

Colonel LOCKWOOD. Even a barrel put down there would start it.

The CHAIRMAN. It would begin to work at once?

Colonel LOCKWOOD. Yes, sir.

The CHAIRMAN. But the probabilities are that there would be no sinking in the way that sand would be up along the sides. It would be washed away entirely on the sides, would it not?

Colonel LOCKWOOD. Yes; that is the idea. This structure of Anderson & Barr was 54 feet in diameter, and that washed away so it was out of level on top to the extent of 9 feet in one night.

Mr. WANGER. You have just been referring to scouring; I have been referring to the 30-foot depth line.

Colonel LOCKWOOD. Yes, sir.

Mr. WANGER. That goes out and recedes again, as I understand it, every fathom-depth line—the 5-fathom lines referred to in the Coast and Geodetic Survey report just mentioned.

Colonel LOCKWOOD. Yes.

Mr. WANGER. Do you know whether the point indicated by Captain Eells for the location of this structure is now pretty well out from that line or whether it is inward toward the coast at present?

Colonel LOCKWOOD. It is in comparatively close to the shoals.

Mr. WANGER. But it changes, as I understand it?

Colonol LOCKWOOD. Yes; but I can give you no figures with regard to the extent of that change or its probable change, for I have no data.

Mr. WANGER. The coast changes at all these points—goes out and comes back again?

Mr. SMALL. Mr. Chairman, when the Board are through with Colonel Lockwood Captain Eells would like to be heard briefly.

Colonel LOCKWOOD. I am here at your pleasure, and I have nothing further, Mr. Chairman.

STATEMENT OF MR. A. L. EELLS.

Mr. EELLS. Mr. Chairman, I wish to speak in regard to the boats. There is no trouble in having a derrick there covering a steam launch, and that boat can be lowered almost any time. When there is a wreck on shore a telephone message can be sent out there. It is almost impossible to launch a boat through the breakers, but this boat would always be off there and she could be lowered at almost any time. There is very seldom a time when a pilot can not be taken in on a ship. A ship, of course, is in motion. This derrick would be stationary and a boat could be lowered away at any time, and also a boat could be picked up there.

Speaking about this brick lining, I do not know anything about that. I am a seafaring man. I have lived on ship. This is practi-

cally a stationary ship. Inside of ship we have no brick in any construction, of course. I know that they are as healthy places to live as anywhere, and everybody that has lived on shipboard, as a general thing, is healthy. That is all I have to say, Mr. Chairman.

Mr. WANGER. Which of these bills do you prefer, the House bill or the Senate bill?

Mr. EELLS. I do not remember; I think the bill that Mr. Hepburn framed was the bill that was satisfactory to me. I think he went into the details, took the matter up very nicely, and I should favor an amendment to the old bill.

The CHAIRMAN. You heard these specifications read here?

Mr. EELLS. Yes, sir.

The CHAIRMAN. You have criticised simply one of them?

Mr. EELLS. Yes, sir.

The CHAIRMAN. And that is the brick lining of the tower?

Mr. EELLS. Yes, sir.

The CHAIRMAN. Now, aside from that, are you willing that those specifications shall be part of your contract with the Government to put this structure in the condition that they require for the accommodation of the light and the light-house keepers, and so on?

Mr. EELLS. I am in your hands; you can arrange the matter, of course, as you think proper, but I understand what the requirements are at sea; I know how much the men want and how much they should have for their provisions, and I should like to be within bounds—that is, not to build a great structure that the sea is going to strike and the wind is going to strike, but I would like to make it as compact as possible. That is my point in the matter.

Now, the idea of luxury and comfort is a small item; the idea of safety is the important thing. If we are going to expand this thing and make a lot of boathouses, and story after story, it is going to be unsafe, and the probabilities are that it will be knocked over, and I do not want that old failure tacked on me. In the case of the Anderson & Barr enterprise, people from Pittsburg made the plans and they tried it and it was a failure. The start was a failure, and if they had gotten further with it it would have been a failure. So I say I don't want a failure tacked onto me. That is all there is about it.

The CHAIRMAN. It is altogether likely and proper that the Government should have to see to the comfort of its people there. The Government is responsible for four men who have to live there for months at a time.

Mr. EELLS. Yes, sir.

The CHAIRMAN. And perhaps you might be influenced a little by cupidity, as other people are?

Mr. EELLS. Possibly.

The CHAIRMAN. And the Government may not be entirely willing to trust this matter to your special interests. What I ask you is, Are you willing that those specifications, with this one exception that you have made with regard to the brick lining, shall become part of your contract with the Government?

Mr. EELLS. Yes, sir.

Mr. TOWNSEND. You say you are a seafaring man?

Mr. EELLS. Yes, sir.

Mr. TOWNSEND Did you ever have any experience in constructing a light-house?

Mr. EELLS. I have had experience in constructing ships.

Mr. TOWNSEND. I understand; but did you ever have any experience in building a light-house?

Mr. EELLS. Never.

Mr. RICHARDSON. You have done about the same thing in building a ship?

Mr. EELLS. I see very little difference.

Mr. SMALL. You have a special plan for the construction of submarine foundations, have you not?

Mr. EELLS. Yes, sir.

Mr. STEVENS. I notice in the specifications there was a certain amount of space required for the storage of oil, coal, water, boats, and for kitchen utensils and provisions, and things like that; that it was required to be at a certain height above the water. Now, if you exclude that brick structure, how do you propose to hoist that stuff into the air and maintain it there year by year safely?

Mr. EELLS. What do you mean?

Mr. STEVENS. In those specifications is it required that so many gallons of water and oil and so much coal must have accommodations for storage there, and there must be so much space for kitchen utensils, and so forth, to be at a certain height above the water? Now, that stuff is very heavy and it is subject to pressure from the winds and waves. How do you propose to maintain that?

Mr. EELLS. By metal. Metal is stronger than brick. Brick is a weak structure, and the action of the sea against a thin brick lining it seems to me is going to make that shaky.

Mr. STEVENS. Then you would have a double metal structure?

Mr. EELLS. I do not know that we would need it double. In our ships we do not have a double structure.

Mr. RYAN. They are not stationary; they give with the waves.

Mr. EELLS. When they are anchored they are stationary.

Mr. RYAN. But they sway to and fro.

Mr. EELLS. Yes, and that is rather a detriment to their strength. This remains stationary and there is no sway except a slight vibration there will be from the wind, and also a portion of it, of course, will be struck by the sea; but that is solid masonry, the same as solid stone.

Mr. ESCH. You say you have your own plan of superstructure. Has your plan ever had any practical demonstration?

Mr. EELLS. It never has.

Mr. WANGER. Have you erected any tower 200 feet in height?

Mr. EELLS. I have not.

Mr. WANGER. Who is the mechanical engineer who has prepared the plan of your structure?

Mr. EELLS. There has been no special engineer. I have taken advice from all the leading engineers. I first got up this plan years ago and when I presented it to an engineer there was fault, and that fault I cut out; and so I went on, cutting out fault after fault and cut out piece after piece, and at last with this last structure not a single fault could be found by any of them. There is Mr. Cooper, who is one of the leading engineers in this kind of work——

Mr. WANGER. Have you the opinions in writing from any of these engineers?

Mr. EELLS. Yes, sir; I have them in writing right here.

The CHAIRMAN. Let me ask you in regard to this provision:

There shall be erected above said circular steel structure, as aforesaid, a circular steel tower or mast of sufficient diameter to contain a spiral stairway, and which shall extend to a sufficient height so that the light to be placed thereon shall be at least 200 feet above mean high tide, all to be substantially and securely constructed.

Now, what is your form of construction of that steel tower?

Mr. EELLS. That would be the same as the mast of a ship and would have shrouds or guys to hold it on each side, or, if the Government wished, there would be no objection to putting up a frail skeleton structure on the outside.

The CHAIRMAN. What would that consist of? What metal would it be built out of?

Mr. EELLS. Steel.

The CHAIRMAN. Of what thickness?

Mr. EELLS. We have not gone into the fine details in regard to that, but of course it is a common thing to build such masts, and the parties who have that business to do would know about it and their judgment would be taken in regard to the thickness and strength required.

The CHAIRMAN. What is your own idea of the thickness?

Mr. EELLS. My idea is that there would be a difference in thickness. The base has more pressure to stand and so at the base it would be very thick.

The CHAIRMAN. What would be the thickness at the base?

Mr. EELLS. I should think somewhere about three-fourths of an inch.

The CHAIRMAN. And at the top?

Mr. EELLS. And at the top I should think half an inch would be sufficient, or possibly three-eighths of an inch.

The CHAIRMAN. How would that be supported?

Mr. EELLS. That would be supported by guys or shrouds. Of course I am a seafaring man and used to using masts supported in that way. We never have much trouble about the vibration of the masts. Here is something standing stationary. There is no motion to the base at all, and I do not see how there is going to be any very great vibration to it. Of course, there may be more or less.

The CHAIRMAN. That steel would rest upon what?

Mr. EELLS. It would rest upon concrete or the masonry constructed below. The mast is stepped on the keelson of the ship. This mast will be stepped down into the concrete.

The CHAIRMAN. How far?

Mr. EELLS. It goes clear down through—chucked down through so it makes a tube for the divers to go down to excavate the sand. It really reaches down through, but I should put on shoulders to support it. There would be a flange to make a bearing for the downward pressure, and the tube extends right downward to the——

The CHAIRMAN. And its diameter would be what?

Mr. EELLS. Between 5 and 6 feet.

The CHAIRMAN. So that it would be about 250 feet long?

Mr. EELLS. Yes, sir.

The CHAIRMAN. It would be the same diameter from bottom to top?

Mr. EELLS. About 50 feet below the water line, yes, so that 250 feet would be about the length of it.

Mr. ESCH. How would you anchor your shrouds if you are going to make your steel tower firm; would you anchor your shrouds in the masonry?

Mr. EELLS. We would have outriggers, we will say, at the deck, which would be the top of this circular cylinder, and then what we call futtock shrouds to the files in the masonry. Of course this would be built into the masonry, somewhere along 12 or 15 feet, to connect right through. Of course these shrouds, as years go on—perhaps in five or six or ten years—would eat away, and then they would be replaced. We would expect this anchoring part of it to last a century.

The CHAIRMAN. And would you have these shrouds attached to crosstrees?

Mr. EELLS. Yes; we would. Three-quarters of the way up, probably, there would be a platform and a place there for living temporarily. It is quite a height for anyone to go up to and down often, and one of the men might want to live there most of the time.

Of course there are many details that we have not gone into. We have not had the matter in shape to go into these details, and we have not considered it was sure of getting through Congress up to this time.

Mr. STEVENS. What would be the weight of the light and the apparatus at the top of the structure?

Mr. EELLS. That I know nothing about. Of course we could get the weight and then get the strength in proportion to hold it up there.

Mr. STEVENS. What would be the diameter at the top of the structure?

Mr. EELLS. That would be what the Light-House Board would want in order to give them the ordinary structure that they use, the ordinary space.

Mr. TOWNSEND. Have you considered the effect of the washing of the sea on the foundation—has it been described here, the washing away of the sand?

Mr. EELLS. I went over to the Coast and Geodetic Survey and they went into the matter very carefully—that was for the Senate—and they made a report. There were slight changes that took place, but my point was this: Has there been any deepening at any particular point? And at this 5-fathom curve at one little place in all their surveys they found there had been a deepening of 3 or 4 feet; that was the extreme. That might possibly have been an error in sounding, or it might not have been; I do not know.

Mr. TOWNSEND. Would not the effect of washing be different where you had a permanent fixture in the sea from where you had no such permanent structure?

Mr. EELLS. Yes; the first thing that would take place would be to bank the water in front of it, and consequently the water would run quicker around the two sides. You notice in the same way the wind will sweep the snow clean in front of a building. So the first thing the water will do when this is put down will be to make a swifter current there, as it does around all rocks that are sunk; it cuts down until it gets down to a certain depth, according to the movable portion of the sands, and according to the force of the current.

If it is a very rapid current it cuts it down deeper, and if the current is slow, it does not cut it so deep. But this is called scouring; it cuts it down to a certain depth and then a filling in takes place. It is just the same as the process that takes place in the formation of a snow bank. At last this hole becomes filled up and instead of there being a hole there the sand banks up all around it. The sand banks

up around all the wrecks on the shoals at Nantucket. I have seen many cases of the kind, and have investigated the matter myself. And so here the sand will bank up over that.

Mr. TOWNSEND. On the sides?

Mr. EELLS. On the sides; yes, sir.

Mr. RYAN. Do you believe that this structure built on the plans you propose will be able to stand a weight of 14 tons at its top, which is the weight we have been advised by the Light-House Board that the light and its accessories will make?

Mr. EELLS. We can make it hold 60 tons if we want to; there is no limit to the amount it can hold; it is only a question of how much metal you put in. If you put in sufficient, any amount of weight can be sustained; that is very easily figured.

The CHAIRMAN. This caisson would be built away somewhere from the Diamond Shoals?

Mr. EELLS. Yes; at Newport News.

The CHAIRMAN. And it would be floated down?

Mr. EELLS. Yes.

The CHAIRMAN. How would you bring it in contact with the sand first—how would you sink it so as to bring it in contact with the sand?

Mr. EELLS. This represents a great circular ship and a ship that is loaded—loaded down to 29 feet. If we are going to put it on a 30-foot shoal, we load her to 29 feet, and it is towed as ships are towed at sea; it is towed to the right position and when it is in the right position an ax is struck which cuts the rigging which holds the valve. The valves then fly open and water rushes in, and the point is to fill it as soon as possible. There is one danger. The motion up and down of this water of course has an effect, and there are a number of sand bars to go over. I have been over the Jacksonville bar, the Charleston bar, and the Georgetown bar, and I know the effects of striking the bottom. I wish this to get as few blows as possible. That is the only danger—the danger of breaking it with the action of the sea. When three or four thousand tons come down that way it is quite a crushing force, and of course we want to have it ground as quickly as we can.

The CHAIRMAN. And then you let in the water and that grounds it?

Mr. EELLS. It sinks to the bottom; yes.

The CHAIRMAN. Then it is on the bottom of the sea?

Mr. EELLS. Yes, sir; on the bottom of the sea.

The CHAIRMAN. Then at once it is an obstacle to the movement of the current of water.

Mr. EELLS. Certainly; yes, sir.

The CHAIRMAN. Will not the tendency of that be to undermine it?

Mr. EELLS. Yes, sir.

The CHAIRMAN. And to undermine it at the side of the current?

Mr. EELLS. No. Suppose the current is running in this direction from you; it would undermine there and undermine here—the two sides.

The CHAIRMAN. Would that moving current have no effect on the side?

Mr. EELLS. Toward you?

The CHAIRMAN. Yes.

Mr. EELLS. It would have the effect to stop the sand and bank it up there.

The CHAIRMAN. Bank it up there?

Mr. EELLS. Yes; but on the two sides it would cut away.

Mr. BURKE. It would bank it up at first? I understood you to say at first it would wash out.

Mr. EELLS. On the two sides I was speaking about; but in the end it would lower this whole structure—it would wash it down, you might say. But as soon as this thing is grounded the wrecking pump is started. It goes on right inside, through this circular tube we have been speaking about—the wrecking pump starts to pump water. Of course, it is down in the sand, and pumps sand as well as water. We discharge vessels that are sunken by pumping water out of them with a centrifugal pump. We pump out sand faster than it scours at the sides, and so pump it down to the necessary depth, and I do not limit myself as to the depth that I can go. Of course, I say not less than 15 feet, but if I wanted to go down 30 or 40 feet of course I have that privilege. It is with us that the risk comes altogether, the risk of loss, and we are going to make the thing permanent.

Thereupon, at 12 o'clock, the committee adjourned.

COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE,
HOUSE OF REPRESENTATIVES,
Washington, D. C., February 2, 1904.

The committee met this day at 10.40 o'clock a. m., Hon. William P. Hepburn in the chair.

There appeared before the committee, and testified concerning the merits of certain legislation pending before the committee, Lieut. Col. Daniel W. Lockwood, engineer secretary of the Light-House Board, and Capt. Charles T. Hutchins, naval secretary of the Light-House Board.

STATEMENTS OF LIEUT. COL. DANIEL W. LOCKWOOD, ENGINEER SECRETARY, AND CAPT. CHARLES T. HUTCHINS, NAVAL SECRETARY, LIGHT-HOUSE BOARD.

The CHAIRMAN. Colonel Lockwood, you have had before you all of these bills, I think, which we have here. I am quite confident that all of the House bills with regard to lights and light-ships have been sent to you. Will you please take your place at the end of the table?

Mr. ESCH. Are you taking them up in the order in which they appear upon our files, Mr. Chairman?

The CHAIRMAN. I have them here in their latest form. Here is Senate bill No. 462, "To construct and place a light-ship off the outer bar of Brunswick, Ga."

Colonel LOCKWOOD. Those matters are in charge of Captain Hutchins, the naval secretary of the Light-House Board. He has everything in his charge relating to floating aids.

The CHAIRMAN. This bill provides:

That the Secretary of the Treasury is hereby authorized and directed to have constructed and placed off the outer bar of Brunswick, Georgia, a light-ship: *Provided*, That the cost shall not exceed $90,000; and the sum of $90,000, or so much thereof as may be necessary, is hereby appropriated for that purpose.

Have you given attention to that subject, Captain?

Captain HUTCHINS. Yes, sir.

The CHAIRMAN. What is the opinion of the Board in regard to it?

Captain HUTCHINS. I think they ought to have that light-ship there. When that was brought up last year there were 5 other light-ships—7 others, I think; but we did not consider it so important as the others. Last year Congress gave us 5 light-ships, and those are now being built.

The CHAIRMAN. What is the necessity for this light-ship there; there is a light-house there?

Captain HUTCHINS. It is an aid to commerce there, and I am told the shipping is one-third more than it is at Charleston.

The CHAIRMAN. Is there a light-house in that vicinity?

Captain HUTCHINS. Yes, sir; you can make a shoal at some distance off. It will be about 18 miles off from the shore.

The CHAIRMAN. What is the necessity for it? Are there shoals there?

Captain HUTCHINS. Yes, sir; that coast is low and it is rather a bad place.

Mr. ADAMSON. The chairman does not understand about the islands there, either.

Captain HUTCHINS. Yes; there are islands there. The commerce of the port, I think, warrants it. I can not give you the exact figures as to the commerce there, however.

The CHAIRMAN. How much of a city is Brunswick?

Captain HUTCHINS. I have never been there, but I understand the commerce is one-third more than that at Charleston. It must be quite a port. They have asked for that for a number of years.

The CHAIRMAN. What would be the cost of it?

Mr. HUTCHINS. They estimate the cost at $90,000. But we can barely build one for that now—one ship alone.

The CHAIRMAN. Will not the establishment of that light-ship involve the building of another?

Captain HUTCHINS. No, sir.

The CHAIRMAN. Do you not have to have two?

Captain HUTCHINS. No, sir; we put a light-ship on sometimes, and put a gas light there, too. We have a relief light-ship in the second district, where they have 11 light vessels. Then we take a relief vessel where they have 7 light vessels, in the fifth district. At Hatteras they have relief vessels.

The CHAIRMAN. What do you say as to the importance of this? Of course you are not going to get all you ask for, and in all probability not quite all that you ought to have. What is the importance of this as compared with others?

Captain HUTCHINS. I think the Brunswick light-ship stands first in importance as to light-ships.

The CHAIRMAN. Of all the projects for light-ships, you would say this was of paramount importance?

Captain HUTCHINS. Yes, sir.

Mr. ADAMSON. I would like him to tell you about the islands down there, and the long indentations in the shore line, all curving into Brunswick.

Captain HUTCHINS. Yes; of course, the shore line runs in there, and this light-ship would be in the center.

Mr. ADAMSON. There are a number of islands there—Wolf Island, and so on.

Captain HUTCHINS. I have never been in Brunswick.

Mr. ADAMSON. Here is an article from a Savannah newspaper, which I want to give to the stenographer.

The CHAIRMAN. Very well.

Mr. ADAMSON. I want to ask you, Captain, if you had information of those wrecks mentioned here? The schooner *Birdsall J. Holmes* went ashore on the breakers at Wolf Island. The other vessels were the schooner *Parker* and the British steamship *Palatina.* Have you any information of those wrecks?

Captain HUTCHINS. No, sir; but the Life-Saving Service keeps all those records.

Mr. ADAMSON. Here is the item:

[From Savannah (Ga.) Morning News, Saturday, January 30, 1904.]

The necessity for placing a light-ship off Brunswick Harbor is again made evident by the accident to the schooner *Birdsall J. Holmes,* which went ashore in the breakers off Wolf Island a day or two ago. This is the third vessel within a month to go ashore near the same spot. The others were the schooner *Parker* and the British steamship *Palatina.* Brunswick has been asking for a light-ship to guide and protect commerce off her harbor for years, and the Senate has recently passed a bill appropriating $90,000 for that purpose. It is to be hoped that there will be no delay in affording the necessary protection to vessels along this coast.

Mr. WANGER. Do you think the limitation of $90,000 is sufficiently large?

Captain HUTCHINS. If we completed one alone it would be barely enough. But if we get more than one—three or more—we could build them for less.

The CHAIRMAN. Why is that? Do you not ask for proposals?

Captain HUTCHINS. Yes, sir; everybody we can get to bid on them.

The CHAIRMAN. Do you submit them all to one person?

Captain HUTCHINS. Yes; when we can save money. On five light-ships we can save many thousands of dollars.

The CHAIRMAN. Does one firm take all?

Captain HUTCHINS. Yes, sir; the New York shipbuilding concern at Camden, N. J.

The CHAIRMAN. What would be the size of this vessel?

Captain HUTCHINS. It would be about 112 or 115 feet long.

The CHAIRMAN. Screw propeller?

Captain HUTCHINS. Yes, sir.

The CHAIRMAN. Of what speed?

Captain HUTCHINS. About 9 knots.

The CHAIRMAN. What would be the complement of men on a vessel of this kind?

Captain HUTCHINS. Let us see; she would have a master—a captain master, a first officer, a second officer, a chief engineer, an assistant engineer, 6 seamen, 2 firemen, 1 oiler, and a cook; I believe that is all.

The CHAIRMAN. What is the coal consumption of such a vessel daily?

Captain HUTCHINS. That depends upon circumstances. In fine weather not so much coal is used, but when they are running a fog whistle they are using a good deal of coal.

The CHAIRMAN. What would be the consumption for a month, say?

Captain HUTCHINS. They stay out there three months, and we put on board 100 tons of coal. That would be about 35 tons a month.

Mr. RYAN. A little over a ton a day?

Captain HUTCHINS. Yes; and we run a searchlight and an electric plant on some of those vessels.

The CHAIRMAN. How much would it cost to maintain that vessel?

Captain HUTCHINS. I think I gave you the figures the other day. It would be $13,580.

The CHAIRMAN. What is the deterioration of a vessel in a year?

Captain HUTCHINS. The exact figures I am not able to state.

The CHAIRMAN. Would it be 10 per cent?

Captain HUTCHINS. Yes, sir; I think anywhere from 10 to 15 per cent. So many things occur. For instance, a vessel comes along and runs into a light-ship. If we find out in such cases who that ship is, we make it pay the damages; but sometimes we are not able to find out.

The CHAIRMAN. Does that frequently occur?

Captain HUTCHINS. Yes, sir; it frequently occurs. Last week a fellow came along and ran into the Diamond Shoal. I sent out and got detectives to libel the ship. In about ten days we found out who it was. We send out and find out vessels that have come into port with their head beams carried away, and their bows injured or beams smashed away, and we get several in that way. We got this fellow the other day. There was one down at Hatteras. Sometimes they put a piece of canvas over the stern, so as to hide the name on the stern, and run away.

Mr. CUSHMAN. Are collisions of that kind of frequent occurrence to a light-ship where vessels running on a course steer for the light-ship? Would not that rather be an argument in favor of not constructing a light-ship—why one should not be constructed, rather than in favor of the maintenance of a light-ship?

Captain HUTCHINS. Of course, if they do not have a light-ship to run into they would probably run ashore; some of them would.

The CHAIRMAN. What is in the way of building a light-house at this point where you would station the light-ship?

Captain HUTCHINS. It is too far off; they are not able to see that distance.

The CHAIRMAN. Is there not some shore line there—some island, or something?

Captain HUTCHINS. You might build a light-house, but it does not come in our system of lights. I have not any charts here with me, I am sorry to say, or I might explain the location.

Colonel LOCKWOOD. Yes; here is a map.

Captain HUTCHINS. A vessel could pick up a light-ship when it would not be able to pick up a light-house.

The CHAIRMAN. Why is that, Captain?

Captain HUTCHINS. Because it is so thick inshore. I have seen lights 40 miles away at night, and then these same lights in a fog could not be seen a mile and a half off.

Mr. LOVERING. You say you can see a light 40 miles? Do you mean from the deck of a vessel?

Captain HUTCHINS. Yes, sir. I saw a light from a deck of a vessel in the English Channel once, that distance.

Mr. LOVERING. Was it not a mirage?

Captain HUTCHINS. No, sir.

Mr. CUSHMAN. The illumination of the light, or, the flash?

Captain HUTCHINS. Yes, sir.

Mr. LOVERING. I did not suppose it went on beyond 28 miles.

Captain HUTCHINS. Sometimes you can see it that far up in the yards.

Mr. LOVERING. I mean on the deck of a ship.

Captain HUTCHINS. You are usually fortunate in seeing it on the deck of a ship 14 or 20 miles. You have not much use for it, though, when you see it at 18 or 20 miles.

The CHAIRMAN. We will pass on to House bill 11132, to establish a light and fog signal at or near Black Ledge, New London Harbor, Conn., $60,000?

Colonel LOCKWOOD. That is a matter that the Light-House Board has recommended for a number of years as an important aid to navigation in New London Harbor.

The CHAIRMAN. You say that is recommended?

Colonel LOCKWOOD. Yes, sir.

The CHAIRMAN. How do you rate that in importance with other projects?

Colonel LOCKWOOD. I do not exactly know what other projects are before the committee. But this project is admitted to be of first importance. That is as far as I can go in that particular.

Mr. RYAN. Fogs are very prevalent there?

Colonel LOCKWOOD. Yes, sir; and there are shoals too.

The CHAIRMAN. What do you say about the limitation of cost—$60,000? Is not that extravagant?

Colonel LOCKWOOD. No, sir; I think not.

The CHAIRMAN. What kind of a light-house would you build here?

Colonel LOCKWOOD. Probably we would build of stone or brick, a skeleton structure. That was the estimate which was handed in when the recommendation for the light-house was first made.

The CHAIRMAN. By the Light-House Board?

Colonel LOCKWOOD. By the light-house engineers.

The CHAIRMAN. What officer makes these estimates?

Colonel LOCKWOOD. The estimates are made by the district officers. I think the original estimate was made for that by Colonel Heap, and it has been indorsed by Major Rosselle, who succeeded him. He is the engineer of the Second district.

The CHAIRMAN. He is an engineer of the War Department?

Colonel LOCKWOOD. Yes, sir.

The CHAIRMAN. A West Point graduate?

Colonel LOCKWOOD. Yes, sir.

The CHAIRMAN. You think that would cost $60,000?

Colonel LOCKWOOD. Yes, sir; I do.

The CHAIRMAN. What kind of a light-house would it be?

Colonel LOCKWOOD. I could not say right now. It would be most likely, as I have already stated, a stone or brick structure, of a skeleton type. It would be out on the ledge, and that is a ledge that is exposed at times, and the building would have to be constructed so as to resist storms and that sort of thing, and in that case it ought to be of stone or brick.

The CHAIRMAN. In the matter of Senate bill 2319, to construct a light-house and fog signal at Diamond Shoal, on the coast of North Carolina, at Cape Hatteras, we asked you the other day if you would prepare the specifications that you would regard as proper and necessary for the construction of a light-house at that place. Would this structure be above the base, say at a point 30 feet from the water?

Colonel LOCKWOOD. Yes, sir.

The CHAIRMAN. Now, will you do that, and make such reference to it as will enable us to refer to it in the bill?

Colonel LOCKWOOD. Did I not hand that in before?

The CHAIRMAN. I would want it to state more explicitly what it is, so that we can refer to it.

Colonel LOCKWOOD. I do not know that I fully understand you. I will do anything you desire, but I would like to be positive as to what you really mean—that is, as to the scope of it.

The CHAIRMAN. I speak simply my own ideas about it. I would be glad if you would make the same specifications for this structure, for this part of the structure, that you would make if you were preparing to let a contract. Get the views of your entire Board expressed in relation to it, and then designate it as the specifications prepared for this work at the instance of the committee, so that it can be referred to in the act.

Colonel LOCKWOOD. Colonel, it would take a month to prepare the detailed specifications for that work. The Board never prepares any detail specifications. It only prepares what I submitted to you last Friday, the general requirements that a structure of this kind should fulfill.

The CHAIRMAN. If that is your view, then put this same paper in the shape that I indicated, and hold it there in your hands as a record in the Light-House Board. Will you do that?

Colonel LOCKWOOD. Yes; it is already in the published reports of the Board.

The CHAIRMAN. But it has no name, and I would like to have you label it in some way, so that we can refer to it.

Colonel LOCKWOOD. Yes, sir.

Mr. ESCH. Colonel, I ask for information. I notice in this bill which we just considered in regard to Brunswick (Ga.) light, that we authorize the Secretary of the Treasury to have it constructed. Now in another bill we have under consideration we authorize the Secretary of the Department of Commerce and Labor to do the work. Why is that?

The CHAIRMAN. The Departments have been transferred.

Mr. ESCH. Oh, I see. So that ultimately it will all come under the Department of Commerce and Labor?

The CHAIRMAN. Yes. I am glad you spoke of that. I had not noticed it.

The CHAIRMAN. Now we will pass on to House bill 39, for a light-house and fog signal on the Rock of Ages, Lake Superior. I had not supposed that that needed anything of that kind there.

Mr. KYLE. I supposed there was always a signal out there.

The CHAIRMAN. Where is this Rock of Ages? I have a sort of faint recollection of the other one.

Colonel LOCKWOOD. It is a small island at the southwest point of Isle Royale, Lake Superior, Michigan.

The CHAIRMAN. Is it on an important route of commerce?

Colonel LOCKWOOD. Yes, sir; it is something which the vessel carriers' associations and the navigators on Lake Superior have been asking for for a long time. It is very essential in making the shore, going down to Duluth westward bound. They make some point on the west shore, and fall down in heavy weather from the northwest; and it is a guide to all those ore ports on the main shore to the west.

The CHAIRMAN. What do you say as to the limit of cost, $125,000?

Colonel LOCKWOOD. In its letter to this committee the Board recom-

mended that $25,000 be appropriated for the purpose of investigating the subject and preparing the plans and specifications, the cost of the structure to be limited to $125,000.

The CHAIRMAN. Do you not suppose that a sufficient light-house could be put up there for $25,000?

Colonel LOCKWOOD. No, sir.

The CHAIRMAN. Why?

Colonel LOCKWOOD. On account of the character of the structure. That has been the judgment of the engineer who estimated for that, and that is the best information the Board has on the subject.

The CHAIRMAN. Tell us, to give us some idea of the cost of these structures, what was the cost of the light-house at Atlantic City?

Colonel LOCKWOOD. I could not tell you that, sir. I could only tell you those that have come along in my time. I have never had occasion to go back to those things.

The CHAIRMAN. There is a good foundation for this one, is there not?

Colonel LOCKWOOD. Oh, yes.

The CHAIRMAN. So that that would not be expensive?

Colonel LOCKWOOD. It has to be a high light and a light of the first order, and the cost of those structures increases very rapidly with the height.

The CHAIRMAN. What would be the comparative importance of this with the other projects on Lake Superior?

Colonel LOCKWOOD. That is regarded as of the first importance, so far as fixed aids to navigation are concerned.

Mr. RICHARDSON. You say, Colonel, practically one-fifth of the amount is to be expended on experiments?

Colonel LOCKWOOD. The engineers stated that it was impracticable to give a detailed estimate of the cost of that structure without a survey of the site and a proper investigation of exactly what was wanted there.

Mr. RICHARDSON. Then one-fifth of the amount that was appropriated will be taken for that investigation?

Colonel LOCKWOOD. Oh, nothing like that.

Mr. RICHARDSON. I thought you said that.

Colonel LOCKWOOD. That is the amount named; but we propose to go ahead with the foundations so far as we can, and do all the work we can in addition to preparing the plans and surveys, and all that. It is merely to start the work.

The CHAIRMAN. Now, House bill 114, a bill "for the establishment of a light-house depot at or near the city of Milwaukee, Wis.," appropriating $75,000. What do you say about that?

Colonel LOCKWOOD. Well, the amount of work in all these light-house districts on the lakes and on the coast is such that a depot is almost an essential. On Lake Michigan it is regarded as actually so, and for years a sort of depot was maintained out on the breakwater; but they have been compelled to move from there on account of the work of the Engineer Department, and recently a small wharf was rented in Milwaukee, with a few sheds on it, for the purpose of carrying on the work that is usually done at those depots—repairing the lens apparatus, and doing a good deal of preparatory repair work for the different stations. That has been going on for about a year, and

it was deemed essential by the Board, in view of the fact that rents will be going up all the time, to acquire a holding, and put up a proper and suitable building to take care of the work of the district.

The CHAIRMAN. Where is the nearest similar establishment to this proposed one?

Colonel LOCKWOOD. The nearest engineer depot is over in Detroit.

The CHAIRMAN. How many have you on the system of northern lakes?

Colonel LOCKWOOD. Three.

The CHAIRMAN. Where are they?

Colonel LOCKWOOD. This temporary one is at Milwaukee, and then there is one at Detroit and one at Buffalo.

The CHAIRMAN. You have none at Chicago?

Colonel LOCKWOOD. There is a buoy depot there, for the storage of buoys.

Mr. ESCH. You have nothing on Lake Superior?

Colonel LOCKWOOD. No, sir.

The CHAIRMAN. You regard this as a proper location?

Colonel LOCKWOOD. It is the most central in that district.

The CHAIRMAN. If this is constructed, will that complete the number necessary on that system of lakes?

Colonel LOCKWOOD. So far as known at present, yes. Eventually I expect there will have to be one up on Lake Superior, because the increase in the number of aids to navigation there is quite rapid.

The CHAIRMAN. What is the use to which you will put this establishment?

Colonel LOCKWOOD. It will be used in the repair of lenses and lanterns. Then the general repair work on the tenders, that could be attended to without going to a dry dock, and the preparation of the iron work, and so forth, required for repairs to light-houses throughout the district, and blacksmith work.

The CHAIRMAN. And storage?

Colonel LOCKWOOD. Yes, sir.

The CHAIRMAN. What supplies would you have there, probably?

Colonel LOCKWOOD. Simply those relating to the engineer part of the work. At present, material.

The CHAIRMAN. What is the character of this material?

Colonel LOCKWOOD. Lumber and iron.

The CHAIRMAN. Have you buoys there?

Colonel LOCKWOOD. To a certain extent.

Mr. BURKE. How many light-houses would there be under the jurisdiction of this depot?

Colonel LOCKWOOD. I could not tell you. It covers all Lake Michigan, from Mackinac to Chicago, and Green Bay, and all around there.

The CHAIRMAN. You regard this as of importance to the proper administration of your bureau?

Colonel LOCKWOOD. Yes, sir. Some such affair as that has to be established.

The CHAIRMAN. What kind of an establishment will this build? What is your idea of it?

Colonel LOCKWOOD. We will buy a site along the water front at some convenient place, and will furnish dockage for the tenders. We have at present to hire dockage for the tenders.

The CHAIRMAN. Will it involve the construction of a dock?

Colonel LOCKWOOD. It probably would, at least the rebuilding and repairing of a dock.

The CHAIRMAN. It is not at all necessary that it should be in a city, but only in some place where you have railroad facilities at a wharf?

Colonel LOCKWOOD. A light-house establishment of that kind should be where articles can be readily obtained—where the supplies can be bought readily.

The CHAIRMAN. Or to which they could be readily transported?

Colonel LOCKWOOD. The office of the engineer is right there in Milwaukee. This district will be under his immediate control all the time. I think it is very necessary that it should be in the city.

Mr. RYAN. What is the annual cost of the maintenance of the present depot in Milwaukee?

Colonel LOCKWOOD. I can only give the cost of the rental of the little wharf they have there at present. I think they pay a thousand dollars now just for a small wharf.

Mr. RYAN. Per year?

Colonel LOCKWOOD. Yes, sir; without any structures of any kind on it.

The CHAIRMAN. Would this structure provide office rooms for the officers of the Light-House Service there?

Colonel LOCKWOOD. No, sir; they are located off in the custom-house.

The CHAIRMAN. You regard this matter as of first importance?

Colonel LOCKWOOD. Yes, sir.

Mr. ESCH. Mr. Otjen, who is here, might want to say a word or two.

The CHAIRMAN. Yes; Mr. Otjen, if you have any questions to ask, you may.

Mr. OTJEN. The ground has been pretty well covered already. The engineer there attempted to impress upon my mind the fact that this is exceedingly important. He has had great difficulty to find a place at which to tie up his boats in the winter time. You remember that on Lake Michigan the navigation is open all winter. His machine shop has been on the north pier. The entrance to the harbor of Milwaukee is between two parallel piers. On the north pier he has had his shop for supplies and the shop for making repairs; but the north pier is to be torn down and rebuilt, and for that reason he can not stay there any longer, and it has been recommended now for four different years, and the ground available which the Government can now secure, very close to the entrance of the harbor, is fast being taken up. Last year quite a piece was bought up by a company in making a wharf. Still there is a place near to the entrance of the harbor, and that is where this ought to be.

The CHAIRMAN. What is the estimate of cost?

Mr. OTJEN. I can not say. It is estimated that it will take about $75,000 to get the ground and build the buildings.

The CHAIRMAN. You have no idea of the cost of the ground alone?

Mr. OTJEN. No, sir.

The CHAIRMAN. There is another bill, House bill No. 115, also introduced by Mr. Otjen, "For the establishment of a third-order flash light and fog signal upon south end of breakwater, harbor of refuge, Milwaukee, Wis.," not to exceed $100,000. What is your opinion of the necessity of this work?

Colonel LOCKWOOD. That is intended to serve as a coast light and a

harbor light for the entrance, and the estimate, I think, for several years was carried along at $75,000. Owing to the increased cost of materials it has been increased. That is a light-house that has been recommended by the engineer of the district, and an inspector, a naval officer, recommended both for a number of years.

Mr. OTJEN. For four years.

The CHAIRMAN. What facilities have you there now?

Colonel LOCKWOOD. There is a small light there, but it has got to come down when the Government finishes that breakwater.

The CHAIRMAN. Why?

Colonel LOCKWOOD. Because they have got to build under it.

Mr. OTJEN. The breakwater has got to be torn down. The entrance to the harbor, the channel, is now deeper than the foundation of the breakwater, and the breakwater must be entirely rebuilt or else it will slide down some day.

Colonel LOCKWOOD. The light-house has got to come off while they are rebuilding the breakwater.

The CHAIRMAN. Do you regard that as essential?

Colonel LOCKWOOD. Yes, sir; because that breakwater without being properly lighted is an obstruction to navigation.

Mr. BURKE. You say the estimate heretofore has been $75,000, and now it has been raised to $100,000 on account of the increased cost of construction?

Colonel LOCKWOOD. Yes, sir; that has been the result in nearly all the estimates the Board has made.

The CHAIRMAN. You regard that as essential, do you?

Colonel LOCKWOOD. Yes, sir.

The CHAIRMAN. Take up House bill No. 4543, introduced by Mr. Burton, "for the purchase or construction of a steel steam light-vessel to be located on Martins Reef, Michigan," in the northwesterly portion of Lake Huron, $35,000. Will you give the committee your views upon that?

Captain HUTCHINS. That was submitted to the inspector, and he recommended that it be built, and the Board took it up. All the commerce now that goes in from Lake Huron to Lake Michigan would pick up this light-ship on this reef. I think we have a gas buoy on it now.

The CHAIRMAN. How near is the nearest light-house to that?

Captain HUTCHINS. There is none shown on this map here. I do not think there is any light-house near that—no light-house that would assist a vessel to keep clear of that reef.

The CHAIRMAN. It is not important, or there would certainly have been one there before this. The gas buoy has served all the purposes, has it not?

Captain HUTCHINS. Yes; but the commerce is increasing all the time.

Mr. ESCH. Is it a light buoy?

Captain HUTCHINS. I think it is.

Mr. WANGER. Was that estimate for this year in the annual estimates?

Colonel LOCKWOOD. Yes; I think it was.

Captain HUTCHINS. Yes; it was estimated for. I think it was asked for last year.

Mr. RYAN. Do you know of any serious wrecks occurring on that reef?

Captain HUTCHINS. No, sir; I do not. The inspector of that district recommended it.

The CHAIRMAN. Who is the inspector?

Captain HUTCHINS. Commander Winslow, I think. It was recommended by his predecessor also.

The CHAIRMAN. That is quite common, is it not, for the inspectors to recommend almost everything that is suggested?

Captain HUTCHINS. No; on the contrary we have considerable trouble that way. The chambers of commerce and the boards of trade and the pilots' associations sometimes recommend things, and the inspectors decline to do it.

The CHAIRMAN. That is because they know better?

Captain HUTCHINS. They do not think the commerce would demand it.

The CHAIRMAN. What do you think would be the annual cost of the maintenance of this vessel there?

Captain HUTCHINS. I should say about $14,000 a year.

The CHAIRMAN. Is there any other method by which the safety of commerce could be provided for without that large expenditure in this place, that has never before had it?

Captain HUTCHINS. I do not think so.

The CHAIRMAN. How do you rate this in the order of importance?

Captain HUTCHINS. I suppose it is about the next one in importance that we have recommended.

The CHAIRMAN. Next to what?

Captain HUTCHINS. Next to the light-ship for Brunswick, Ga.

Mr. RICHARDSON. Did I understand you to say that the Light-House Board had made a recommendation? The inspector went there to investigate it, and he could turn down a recommendation if he wanted to?

Captain HUTCHINS. The boards of trade and the chambers of commerce in the different places, and the commercial men and the pilots and masters' associations and representatives, make requests to the Light-House Board for these different aids to navigation, and state why.

The CHAIRMAN. Let me ask you, Captain, have you ever known of a board of trade or a chamber of commerce in any city of the United States hesitating to ask for anything of this character that was suggested to them? Did you ever hear of such an instance?

Captain HUTCHINS. I do not remember that I ever have.

The CHAIRMAN. They are organized to ask for things, are they not?

Captain HUTCHINS. Yes, sir.

The CHAIRMAN. That is their purpose in life.

Captain HUTCHINS. I do not think the Light-House Board will ask for those that are not necessary.

The CHAIRMAN. I am not impugning the Light-House Board. I am speaking of these gentlemen who are your suggesters—who suggest to you things they want to have done.

Captain HUTCHINS. We are conservative enough to know that when you once get an aid to navigation, you can build as many more as you like around it. Let the first one stay. We discontinue lights here frequently, and they all take it up. The engineer of the district out in Milwaukee, the other day, and the inspector of the district, recommended that one be discontinued, and the Light-House Board thought so, too; and the board of trade took it up.

The CHAIRMAN. And thought it ought not to be discontinued?

Captain HUTCHINS. Yes, sir.

Mr. RYAN. And what did they do?

Captain HUTCHINS. They asked that it be continued.

Mr. STEVENS. Did you discontinue the light on Isle Royale?

Colonel LOCKWOOD. That was a number of years ago. I think a reestablishment has been recommended on account of the growth of commerce there.

The CHAIRMAN. Now take up House bill 4860, "for the establishment of a light-house and a fog signal at Isle au Haut, Maine."

Colonel LOCKWOOD. I do not like to try that name but once a day, Colonel. Isle au Haut, it is.

The CHAIRMAN. I did not dare tackle that.

Colonel LOCKWOOD. That is at the mouth of the eastern entrance to Penobscot Bay. It is used by vessels going in and out among the islands, from Mount Desert Island over to Penobscot Bay, and it has been recommended by the Board that a light and fog signal be established there, at a cost of $14,400. Those are the figures, as I recall them.

The CHAIRMAN. Is that important?

Colonel LOCKWOOD. All the people running steamboats up there in the summer seem to think so.

The CHAIRMAN. What do they think?

Colonel LOCKWOOD. The district officers have recommended that it be established, and the Board has approved their report. I do not know anything about the locality. I have never been there. But it is a place of refuge for fishermen in bad weather. It is a very important point in that locality, and it serves as a guide to vessels navigating those channels.

The CHAIRMAN. Colonel, does your Board ever make tours of inspection of the coast and the light-houses and the proposed improvements along it?

Colonel LOCKWOOD. Yes, sir.

The CHAIRMAN. Upon what does the Board form its opinion of the utility and comparative necessity of such works?

Colonel LOCKWOOD. It must rely mainly—almost entirely—upon the reports of the district officers, the engineer officer and the naval officer. They investigate those points, and consult with commercial bodies where it is necessary.

The CHAIRMAN. Now, these officers usually live somewhere near the localities, do they not?

Colonel LOCKWOOD. Yes, sir.

The CHAIRMAN. And they are subject to all of the influences of those localities?

Colonel LOCKWOOD. They are going about all the time inspecting and examining and repairing, and they know the localities.

The CHAIRMAN. But you spoke just now of their deriving information from boards and these people. That was interesting.

Colonel LOCKWOOD. Yes, sir; very often they will have hearings and hear what these people have to present.

The CHAIRMAN. There are 18 of these districts, are there?

Colonel LOCKWOOD. No, sir; there are 16.

Mr. RYAN. The engineer in charge of each district makes an annual inspection of all the light-houses in his district?

Colonel LOCKWOOD. Yes, sir; the inspector is required by the regulations of the Board to inspect every three months. The engineer

is out himself personally, or his first assistant is, and superintends and oversees it; and they are examining these things all the time. If a light keeper reports anything out of order somebody is sent there to fix it at once.

The CHAIRMAN. How many light-houses, permanently fixed establishments, have we in the United States approximately?

Colonel LOCKWOOD. Well, it is given in the front part of the report. I can not carry the figures in my head. The light-houses and beacon lights number 1,425.

The CHAIRMAN. How many light-ships are there?

Colonel LOCKWOOD. Forty-five in position, and 8 relief vessels.

Mr. LOVERING. How many of these light-houses are first-class lights?

Colonel LOCKWOOD. I could not tell you that. Many of the second and third order of lights now are more powerful than the old first-order lights are. For instance, the old fashioned first-order lights, fixed, would have a candlepower of about 8,800, and the modern light establishment would have 970,000 candlepower, or something like that.

Mr. LOVERING. Than the method of classifying lights is imperfect?

Colonel LOCKWOOD. It is out of date; yes, sir.

Mr. RICHARDSON. Do you recall any of these projects on which you have made an adverse report recently—any of these proposed improvements?

Colonel LOCKWOOD. Yes; I remember one.

Mr. RICHARDSON. How many?

Colonel LOCKWOOD. I say I recall one. Very frequently the Board recommends that such and such a matter be left to await the future development of commerce, and that sort of thing.

Mr. RICHARDSON. That is as near an adverse report as you recall now?

Mr. WANGER. The language of this proposed appropriation seems to be couched in the strongest terms of any—this one at Isle au Haut, Maine—although it is a small matter comparatively. The note says:

> This light and fog signal would be of inestimable value to the many fishing vessels, ranging in size from 10 to 100 tons burden, which frequent the waters of Lower East Penobscot Bay and the waters seaward, which are excellent fishing grounds, but very dangerous when certain winds suddenly arise. The establishment of this light and fog signal station would guide them into a safe and near harbor.

I have not observed anything that is quite as strong as that.

Colonel LOCKWOOD. May I ask you what that is from?

Mr. WANGER. This is from the Book of Estimates. It is apparently a note from one of the reports of the Light-House Board.

The CHAIRMAN. Do you know anything about the importance of that fishing interest there?

Colonel LOCKWOOD. No, sir.

The CHAIRMAN. It may be it would be cheaper to buy out the fleet.

Mr. WANGER. The report says "many vessels." Whether that means 10 or 100 I do not know.

Mr. KYLE. Did you never go on a fishing tour, Colonel?

Colonel LOCKWOOD. They must defend themselves—fishermen must defend themselves when they are attacked.

The CHAIRMAN. In our treaties and in our surrenders of land in order to make fishing treaties we have subjected the Government to a cost of millions of dollars. How would you rate the importance of this, Colonel Lockwood?

Colonel LOCKWOOD. That is largely a local matter, sir. These other matters that I have referred to are of more than local interest.

Mr. LOVERING. Is not Isle au Haut chiefly a watering place?

Colonel LOCKWOOD. No, sir; I do not think it is. But it is on the road to Penobscot Bay, and Bar Harbor, and other resorts.

The CHAIRMAN. Here is another bill, House bill No. 5219, also "for the establishment of a light-house and fog signal at Isle au Haut, Maine." That is the same thing.

Mr. RYAN. The amount is stated in this latter bill—$14,400.

The CHAIRMAN. House bill 6478, "To provide for the construction of a light-house tender for construction and repair service." That is by Mr. Legare.

Colonel LOCKWOOD. That is a tender, sir, that is required in the Sixth district at Charleston. The boat that has been used there was the schooner called the *Pharos;* that is over 50 years old, and recently she was inspected by the Government inspector of hulls, and the estimate of the cost of putting her into shape was so great that it was not deemed advisable to repair her.

The CHAIRMAN. What would be the probable cost of a schooner of that character?

Colonel LOCKWOOD. I could not give any idea of that.

The CHAIRMAN. This, I see, is $130,000.

Colonel LOCKWOOD. That is for the steam tender.

The CHAIRMAN. A schooner would probably cost $10,000?

Colonel LOCKWOOD. She would cost more than that.

The CHAIRMAN. Twenty-five thousand dollars?

Colonel LOCKWOOD. It is merely guessing on my part, Colonel.

The CHAIRMAN. Captain Hutchins, what is your opinion about that?

Captain HUTCHINS. Of course it would depend upon the size. I fancy you could build a schooner for $20,000. I am not familiar with the engineer's work, but there is a good deal of time lost, and there is no satisfaction in that service, owing to the lack of a vessel. I do not know how we will get along with that schooner under the present conditions.

The CHAIRMAN. What is the range of service prescribed for this vessel? Does it do the work of an entire district?

Mr. HUTCHINS. Yes, sir; of an entire district. But she only works in the Charleston district. She comes under the engineer of the district. We are asking for a tender for the inspector for that district also. He at present has a side-wheel steamer, and is not able to do the work of that district efficiently with her.

Mr. CUSHMAN. One member interested in these two bills spoke to me about that, and I was going to ask what was the necessity of both of these boats. One item is to provide for the construction of a light-house tender for construction and repair service. That is House bill No. 6478. And the next bill is No. 6479, a bill to provide for the construction of a light-house and buoy tender. Both, I believe, are for the Sixth light-house district. Both boats, I believe, are designed for use in the same locality.

Captain HUTCHINS. Yes, sir; the second one you refer to, the buoy tender, for the inspector, is to take the place of the side-wheel steamer we have there now, the *Wistaria.* She is not worth repair. We have not decided as yet what to do with her.

Mr. CUSHMAN. Would it be impossible, in your opinion, to have one vessel perform the functions of the two vessels?

Captain HUTCHINS. The inspector has all he can do, with one vessel, to go around the district now. He ought to have a vessel by all means. From St. Johns River, I think, south there is no place they can get in—a distance of 200 miles of the coast and 200 miles back where there is no harbor. He ought to have a vessel for outside work. This *Wistaria* is a side-wheeler, and they have to take their chances in running out and getting back before bad weather comes along. A good many of our vessels have to do that.

The CHAIRMAN. What is the procedure when you are building a vessel?

Captain HUTCHINS. After the contract is signed we——

The CHAIRMAN. Before that, I mean.

Captain HUTCHINS. The designs are all made in the Light-House Board by our superintendent of construction and designers.

The CHAIRMAN. These bills provide for the employment of three draftsmen at current rates to prepare the plans for the light-house tenders.

Captain HUTCHINS. We have not got the people. Out of the money that you appropriate for a ship must come sufficient to cover the cost of draftsmen and superintendence, and all these plans come out of it. We have no funds for this purpose.

The CHAIRMAN. You have not the authority to employ these draftsmen unless the funds are available?

Captain HUTCHINS. No; the moment these bills pass for a vessel we then employ draftsmen, and if the work ceases we discharge them.

The CHAIRMAN. What, according to your idea, should be the cost of these vessels?

Captain HUTCHINS. We have estimated them at $130,000.

The CHAIRMAN. Are two needed in that district?

Captain HUTCHINS. I suppose the engineer ought to have a vessel, and undoubtedly the inspector should have one. He has one now, but she is not able to do the work.

The CHAIRMAN. Why can not the engineer go with the inspector?

Captain HUTCHINS. He might, sometimes; but there would be too much work for one vessel to do.

The CHAIRMAN. Then you regard both of these as important?

Captain HUTCHINS. Yes, sir; I think they are important. I know the inspector's vessel is very important.

Mr. RYAN. The engineer's vessel is for the purpose of going around and fixing up the repairs reported by the inspector?

Captain HUTCHINS. Yes, sir; and he repairs all the light-houses.

The CHAIRMAN. One is called a buoy-tender?

Captain HUTCHINS. Yes. That is the inspector's tender. He has a good many buoys in that district that have to be tended to.

The CHAIRMAN. That is the one you regard as very important?

Captain HUTCHINS. Yes, sir; very important.

Mr. ESCH. Was the *Pharos* a buoy-tender?

Colonel LOCKWOOD. No, sir; she was a repair schooner.

The CHAIRMAN. What do you say about this other one, House bill 6478? That is the tender for repair service.

Captain HUTCHINS. Colonel Lockwood asks for that.

Colonel LOCKWOOD. We have to make repairs of all these structures from Cape Fear down to Jupiter Inlet.

The CHAIRMAN. Is it important?

Colonel LOCKWOOD. Yes, sir. The engineer has got to have a boat of some kind, and the question is whether it is worth while to fool along with a poor boat or not.

The CHAIRMAN. Then that is one of the first-class projects?

Colonel LOCKWOOD. Yes, sir.

The CHAIRMAN. Gentlemen, the hour for adjournment approaches. If you will kindly appear here again on next Friday I think we shall probably get through.

Colonel LOCKWOOD and Captain HUTCHINS. Very well.

Thereupon, at 12 o'clock noon, the committee adjourned.

COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE,
Friday, February 5, 1904.

The committee met at 10.30 o'clock a. m., Hon. W. P. Hepburn in the chair.

STATEMENT OF LIEUT. COL. DANIEL W. LOCKWOOD, CORPS OF ENGINEERS, U. S. ARMY, ENGINEER SECRETARY OF THE LIGHT-HOUSE BOARD.

The CHAIRMAN. Have you given any attention to the House bill 7029, authorizing the retirement of light-house keepers and the payment to them of a pension?

Colonel LOCKWOOD. The Light-House Board has stated that it was not prepared to recommend the establishment of a retired list for keepers.

The CHAIRMAN. Has that been a subject that has been called to the attention of the Board, and has it received discussion?

Colonel LOCKWOOD. The Board has not taken it up since I have been with it at any of its regular meetings. It has been acted upon, I think, previous to that time, but its action was merely——

The CHAIRMAN. This bill is a very brief one. It reads:

That the Secretary of the Department of Commerce and Labor be, and he is hereby, authorized and directed to place on a retired list all light-house keepers in the service of the Government of the United States who shall, while in such service, attain the age of sixty years, and pay them a pension equal in amount to one-half the pay they were receiving at the date of such retirement: *Provided*, That if any such light-house keeper shall be found upon physical examination competent and qualified to continue in the service after the age of retirement he may be retained in said service.

Have you taken any pains to ascertain the probable cost of that to the Government?

Colonel LOCKWOOD. No, sir; not that I know of. I can not recall that any figures have been prepared on that.

The CHAIRMAN. About how many light-house keepers are there now?

Colonel LOCKWOOD. I could tell you by reference to the list. I think there are something like 8,000 employees in the Light-House Department. This is rather a guess, Colonel Hepburn, but I should

say there were probably three-fourths of those who were keepers or in that position.

The CHAIRMAN. Probably about 6,000 light-house keepers?

A BYSTANDER. One thousand five hundred and fifty.

Colonel LOCKWOOD. One thousand five hundred and fifty light-house keepers.

Mr. ESCH. That is on the first page of your report.

Colonel LOCKWOOD. That was a guess, and a bad one. I was going on the number of light-houses.

The CHAIRMAN. Have you any record of the ages of these men?

Colonel LOCKWOOD. No, sir. Now, it says here, "Light keepers, about 1,550," and "Laborers in charge of post lights, about 1,600." I was going by that in a certain measure, and still it was a very poor guess.

No, sir; I have not any record in regard to their ages. They range from young men up to old men—very old men, some of them.

The CHAIRMAN. What is a light-house keeper?

Colonel LOCKWOOD. The light-house keeper is a man stationed at a light-house whose duty it is to care for the light and the fog signal, if there is one, and to take care of the Government property at the station.

The CHAIRMAN. A man who was in charge of a buoy, merely, you would not call a keeper?

Colonel LOCKWOOD. No, sir.

The CHAIRMAN. Only those who are in charge of a permanent structure?

Colonel LOCKWOOD. Yes, sir.

The CHAIRMAN. So that the word "keeper" has a definite signification?

Colonel LOCKWOOD. Yes, sir.

Mr. ESCH. Just one question. Could there be any reason, then, for excluding the men in charge of light-ships?

Colonel LOCKWOOD. I think not.

Mr. ESCH. They would be just as worthy as the light-house keepers if this legislation is to go into effect?

Colonel LOCKWOOD. I should say so, except that a great many of the people employed on light-ships do not continue in that employment as long as light keepers.

Mr. ESCH. The detail is for three months at a time?

Colonel LOCKWOOD. No, sir; that is only in certain cases. I think the seamen are—well, they are hired, and can quit when they want to, as anybody else can; but they do not continue in the service as long as light keepers do.

Mr. RICHARDSON. His duties are of a specific character; they are not military but civil.

Colonel LOCKWOOD. To which clause do you refer?

Mr. RICHARDSON. He is a civil employee and has nothing to do with military matters?

Colonel LOCKWOOD. No, sir.

Mr. STEVENS. And he can leave any time he wants to?

Colonel LOCKWOOD. Yes sir; any of them can.

The CHAIRMAN. What compensation do you pay these keepers?

Colonel LOCKWOOD. Captain Hutchins can tell you that. I have nothing to do with the keepers. After the light is constructed and

turned over then the care of that light passes to the naval secretary. They get, I think, from about $1,200 a year down to $8 or $10 a month, if they are looking after a post light, or something of that kind.

The CHAIRMAN. Looking after what?

Colonel LOCKWOOD. Ordinary lamps that are hung on posts on a river. They are laborers and are classed as laborers.

The CHAIRMAN. Those men have rather a more arduous life than that of a keeper?

Colonel LOCKWOOD. No, sir; the light is ordinarily near where they live, and they go out and put it up at dusk, and take it down again in the morning.

The CHAIRMAN. Are the light-house keepers exposed to any special peril?

Colonel LOCKWOOD. Not specially so, except in their attempts to rescue people who are wrecked, sometimes. In the line of their duty there are no special perils.

The CHAIRMAN. Is their life specially one of hardship?

Colonel LOCKWOOD. No, sir.

The CHAIRMAN. They are pretty comfortable berths, are they not, sometimes?

Colonel LOCKWOOD. Yes, sir.

The CHAIRMAN. And the greatest detriment to their enjoyment is their isolation?

Colonel LOCKWOOD. It is having to do a certain thing at a certain time continuously.

The CHAIRMAN. They have to be there?

Colonel LOCKWOOD. Yes, sir.

Mr. RICHARDSON. They simply have to perform the duties for which the Government pays them?

Colonel LOCKWOOD. Yes, sir.

Mr. RICHARDSON. That is all?

Colonel LOCKWOOD. Yes, sir.

The CHAIRMAN. We have here also H. R. 7635, a bill to place three lighted buoys on the outer bar of Brunswick, Ga.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of the Treasury be, and he is hereby, authorized and directed to place three lighted buoys on the outer bar of Brunswick, Georgia, to wit, one lighted buoy each at the present location of buoys numbered two, four, and four and a half, now placed on said bar, and the sum of seven thousand five hundred dollars, or so much thereof as is necessary, is hereby appropriated for this purpose.

What do you say about the importance of that?

Colonel LOCKWOOD. Well, that is a floating aid that I have nothing whatever to do with.

The CHAIRMAN. Who has charge of that?

Colonel LOCKWOOD. Captain Hutchins.

The CHAIRMAN. Captain, will you please give us your views about that?

Captain HUTCHINS. The executive committee of the Light-House Board took that up and it was referred to the inspector of the Charleston district, and he recommended against it. Then we looked into it and supported his recommendation that it not be placed there.

The CHAIRMAN. How is that?

Captain HUTCHINS. That that should not be allowed and not placed. That is a shifting bar, and frequently a light-house tender has to go

there and put down small buoys in order for vessels to get in and out. The larger buoys have to be changed very frequently, and then these gas buoys they want, some of our gas buoys have to go in 30 feet of water—that is, the best ones we make now—to stand the heavy water and the sea. This bar is shallow. I think there is about 7½ feet of water on the bar, and these buoys are to go in shallow water—20 feet. They would not be able to keep a buoy there. The sea would carry them away and they would be a menace to navigation instead of being useful.

There are two lights there, one range light and a beacon, and when you get those in range it is supposed to take you over the bar, unless the bar has shifted; and there is a whistling buoy on the entrance of the bar, and it is 7 miles from the light-house. That will stay there. If they can make that whistling buoy they are all right.

The CHAIRMAN. The Board does not approve of this?

Captain HUTCHINS. No, sir; the Board has declined to recommend it.

The CHAIRMAN. Has any other gentleman any questions to ask? If not, we will pass to No. 7636, which is "A bill to construct and place a light-ship off the outer bar of Brunswick, Ga."

Mr. ADAMSON. That is what they want in place of these buoys you have.

The CHAIRMAN. The next is No. 9883, "A bill to fix the compensation of light-house keepers and provide for their retirement on half pay."

Mr. RICHARDSON. 9883.

The CHAIRMAN. What is the pay of light-house keepers now?

Captain HUTCHINS. It depends on where the light-house is situated and what the work is that the men have to do. I think the keeper that gets the most pay is on a light in Hell Gate, and I think his pay is $1,200, and it goes from that down, so that some of them get only $300. It depends on the light and the work they have to do. Some of our keepers in Alaska get very well paid. There they have to be allowed three or four keepers to the light-house, because they are isolated, and sometimes they hardly get any mail, and they are cut off from the world, and frequently they become insane. Two of them, since I have been secretary of the Light-House Board, have become insane.

Mr. RICHARDSON. Have become insane?

Captain HUTCHINS. Yes, sir; it is the isolation. Here a short time ago at one of our lights—I do not remember which light it was—there were two keepers, and they got short of food and did not have anything to eat, and one of them went away in a small boat to see if he could get something or communicate with the shore, and the towns are so far away there, it is such a long distance to go, that this man did not turn up for several months, and we reported him dead or lost.

Mr. RICHARDSON. Did you count that man insane because he did not perform his duties?

Captain HUTCHINS. He did not get insane. He turned up all right. His boat was smashed up, but he managed to get back. And in the meantime a ship happened along and gave the other light-house keeper something to eat. Those are the difficulties they have to contend with.

The CHAIRMAN. What would you say was the average pay of a light-house keeper?

Captain HUTCHINS. The law says that the average shall not exceed $600 for all the light-house keepers. That is the law of Congress.

The CHAIRMAN. This bill provides that the compensation received by light-house keepers shall be $60 per month, and assistant keepers $40 per month. Do you favor a uniform scale of compensation?

Captain HUTCHINS. No, sir; it is impossible to carry out any such thing as that.

The CHAIRMAN. Have you an officer that you call an assistant light-house keeper?

Captain HUTCHINS. No, sir. You see we have 62 light-house districts, and each district has an inspector, and he comes under me. He is a naval officer, and there is always an engineer in there, an engineer for each district, but we have not enough engineers to give them each a district. All the engineers come under Colonel Lockwood. These inspectors inspect the lights and carry on their work and are responsible to the Board.

The CHAIRMAN. You have no officer known as an assistant light-house keeper?

Captain HUTCHINS. No, sir; we have assistant keepers and first assistants and second assistants.

The CHAIRMAN. You do?

Captain HUTCHINS. Yes; and third assistant keepers. But we have no officers. Well, if you call a light-house keeper——

The CHAIRMAN. He is an officer of the Government.

Captain HUTCHINS. Yes; an employee of the Government. He holds no——

The CHAIRMAN. No commission?

Colonel LOCKWOOD. No, sir; he has an appointment.

The CHAIRMAN. He fills an office that is often named in the statutes of the United States?

Mr. HUTCHINS. Yes, sir.

The CHAIRMAN. A "light-house keeper?"

Captain HUTCHINS. Yes, sir.

The CHAIRMAN. The board would not favor a uniform compensation?

Captain HUTCHINS. No, sir; I do not see how it is possible to carry it out.

The CHAIRMAN. You say the average compensation is about $600.

Captain HUTCHINS. Six hundred dollars a year. We are not allowed to exceed that by statute.

The CHAIRMAN. Now, how do you manage to pay the larger sums in these special cases.

Captain HUTCHINS. You see there are not very many who get over $600.

The CHAIRMAN. You spoke of one at Hell Gate that gets $1,200.

Captain HUTCHINS. Another man probably not a mile or not more than a couple of miles away would not get more than $350.

The CHAIRMAN. You say you are not allowed to pay more than $600?

Captain HUTCHINS. Yes, sir; the provision of the law is that the total sum paid to light-house keepers shall not average more than $600, taking the whole lot.

The CHAIRMAN. Oh, yes. Well, we will pass from that and take up next No. 10447, a bill introduced by Mr. Crumpacker, entitled "A bill authorizing the establishment of a light-house at Indiana Harbor, in the State of Indiana." It provides—

That a light-house be established on the coast of Lake Michigan at Indiana Harbor, in the State of Indiana, at a cost not exceeding ten thousand dollars.

Colonel Lockwood, does that meet the approval of the Board?

Colonel LOCKWOOD. The Board knows nothing about the harbor. The Engineer Department stated this morning that the Government had never appropriated any money for the improvement of that harbor, and no preliminary examination for its improvement had ever been made. It appeared to be a harbor established by private enterprise.

The CHAIRMAN. Would the recommendations of this bill meet the approval of the Board?

Colonel LOCKWOOD. No, sir; not under the circumstances.

The CHAIRMAN. The next we will take up is Senate bill 2685:

AN ACT to amend an act entitled "An act authorizing the construction of additional light-house districts," approved July twenty-sixth, eighteen hundred and eighty-six.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That section forty-six hundred and seventy of the Revised Statutes is hereby amended so as to read as follows:

"SEC. 4670. The Light-House Board shall arrange the ocean, gulf, lake, and river coasts of the United States into light-house districts not exceeding eighteen in number; that any law or regulation prohibiting the employment in the light-houses of the United States of persons of more than forty-five years of age be, and the same is hereby, repealed."

That was passed by the Senate December 17, 1903. Now, what do you say about those two recommendations?

Colonel LOCKWOOD. The establishment for the allowance of 18 districts the Board has recommended each year since lights have been authorized in Porto Rico and Alaska.

The CHAIRMAN. Now, if you had this, to increase the number of light-house districts, what districts would you establish?

Colonel LOCKWOOD. One would be to include Porto Rico and Guantanamo, in Cuba, and the other would be to include Alaska.

The CHAIRMAN. Then those on the coast line of the United States and the lake coasts of the United States would not change?

Colonel LOCKWOOD. They would remain practically the same as at present, sir.

The CHAIRMAN. Do you understand that was the idea of the gentleman who introduced this bill, or the opponents of it, that those two districts were wanted, or did they want to increase the continental districts?

Colonel LOCKWOOD. I am quite positive, sir, that it was with a view of making a separate district for Alaska and one for Porto Rico that they were introduced.

The CHAIRMAN. What do you say as to the second proposition here, to remove the age limit of employees in the light-houses? It repeals the act that prohibits you from employing persons of more than 45 years of age.

Colonel LOCKWOOD. I do not know anything about that, sir. I do not know of any such regulation.

Captain HUTCHINS. This is a mistake, I think. There is no limit as to age.

The CHAIRMAN. You do employ people older than 45 years?

Captain HUTCHINS. Yes, sir.

Mr. STEVENS. Is there any sort of regulation by the Department or civil service?

Captain HUTCHINS. I know it occurred the other day when three names were submitted to us——

Mr. STEVENS. You would give preference to the younger man instead of an older man?

Mr. KYLE. Those in the civil service; yes.

Mr. STEVENS. Yes.

The CHAIRMAN. Are all your employments made through the civil service?

Colonel LOCKWOOD. Yes, sir.

The CHAIRMAN. You make no selections yourselves?

Captain HUTCHINS. They submit three names and we select one.

The CHAIRMAN. Are you usually acquainted with those men—that is, are you acquainted with their qualifications?

Captain HUTCHINS. We have their examination papers.

The CHAIRMAN. Nothing more?

Captain HUTCHINS. Then we call them up.

The CHAIRMAN. You are not even furnished with figures as to their ages?

Captain HUTCHINS. No, sir; we can send for them.

The CHAIRMAN. Do you send for figures, usually?

Captain HUTCHINS. No, sir.

Mr. WANGER. Do you send for the men?

Captain HUTCHINS. Yes, sir; we can send for them.

The CHAIRMAN. Can you send for all three of them before you make the selection?

Captain HUTCHINS. Yes; if we choose to do so.

The CHAIRMAN. You can?

Captain HUTCHINS. Yes, sir.

The CHAIRMAN. Have you ever done that?

Captain HUTCHINS. No, sir; not that I know of. I have had the chief clerk look at the man and see if he was what he wanted—that was, selecting people in the district. The man selected for the district; I imagine they would send for all of them.

The CHAIRMAN. Out in the district, are they selected by you or your subordinates, or how?

Captain HUTCHINS. The inspectors select from the list of eligibles.

The CHAIRMAN. Then the civil service only interferes with your clerical force in the city?

Captain HUTCHINS. The whole Light-House Establishment is under the civil service—everybody—and we can not turn anybody out without preferring charges in writing, and those are submitted to the Light-House Board, and they sum up the case and submit it in writing to the Department of Commerce and Labor as to whether it shall be approved or not. It is very strict. It is a mighty good thing for us.

Mr. KYLE. It is a good thing?

The CHAIRMAN. How a good thing for you? When you say "for us," do you mean for you gentlemen personally?

Captain HUTCHINS. No, sir; for the light-house establishment.

The CHAIRMAN. Explain that, please; will you?

Captain HUTCHINS. No friend can come in, you know, to assist one. These men pass the examination, and their names are submitted and they are selected on their merits.

Mr. RICHARDSON. Three names are submitted?

Captain HUTCHINS. Yes, sir.

Mr. RICHARDSON. Then the friendship comes in?

Captain HUTCHINS. No, sir; not at all.

Mr. RICHARDSON. You do not see the men?

Captain HUTCHINS. Yes, sir.

Mr. RICHARDSON. That is, you could see them?

Captain HUTCHINS. Yes, sir.

Mr. RICHARDSON. You could, but you do not?

Captain HUTCHINS. No, sir; generally not.

The CHAIRMAN. Why might not the friendship come in there just as in any case?

Mr. STEVENS. Have you any objection to taking the recommendation of a man about these things?

Captain HUTCHINS. No, sir. A recommendation is a nice thing.

Mr. RICHARDSON. You would not hesitate to take the recommendation of a friend if the man was qualified and competent?

Captain HUTCHINS. No, sir; I would not have anything to do with it.

Mr. ADAMSON. Is it not a mistake to assume that all Congressmen are enemies of the Government and——

Mr. RICHARDSON. And unreliable?

The CHAIRMAN. Do you know anything about these age limitations of the civil service?

Captain HUTCHINS. I do not believe there is any such thing. I am not prepared to state, but there is no age limitation in the Light-House Establishment such as this bill refers to.

Mr. STEVENS. Might it not be that in some of the civil-service positions in which they take an examination the age for which they can give the maximum marking is 45? Might this be a regulation of that kind?

Captain HUTCHINS. I do not know.

The CHAIRMAN. A regulation and not a law?

Mr. STEVENS. It says so here.

Colonel LOCKWOOD. I think in determining the marks age does cut a figure.

Mr. STEVENS. The age for the maximum is 45.

Captain HUTCHINS. A man is in his prime at 45, mentally and physically.

Mr. STEVENS. There is no such regulation?

Captain HUTCHINS. No, sir.

A MEMBER. I think there is no regulation, Mr. Stevens. It does not recommend men who are in excess of 45 years of age. Did you ever have occasion to consider men of over 45?

Captain HUTCHINS. Yes, sir. There was an examination carried on at Tompkinsville, Staten Island, and there was a man took that examination, and he was a very good man, but they said, "His age may be against him, being pretty old." The man, I think, was 55 years old.

Mr. ADAMSON. The older a man gets the more he learns.

Mr. STEVENS. What was done about that man?

Captain HUTCHINS. I am under the impression that we took him. He knew more than any of the rest of them and was a very good man.

Mr. KYLE. I approve of an action of that sort.

Mr. RICHARDSON. When you approve a man, in whatever way you take him in, do you put in applicants that do not live in the district?

Captain HUTCHINS. Yes, sir; from anywhere.

Mr. RICHARDSON. Then you are different in that respect from the Life-Saving Service?

Captain HUTCHINS. The inspector of the light-house district is the chairman of the board.

Mr. RICHARDSON. Your appointments are open to applicants from the whole country?

Captain HUTCHINS. Yes, sir.

Mr. RICHARDSON. Not limited to the districts?

Captain HUTCHINS. No, sir. Then they hold these civil-service examinations and send us 15 or 20 men from the Civil Service here, and whenever we want somebody we write to the Civil Service and ask for three names and tell them what we want, a stenographer and typewriter, or whatever it may be, and they submit three names and we make a selection out of those three.

Mr. STEVENS. Do you not take age into consideration, then?

Captain HUTCHINS: Yes; in certain things. For instance, you take a superintendent of construction. Some of the superintendents of construction here have a man traveling all the time. Now, an old man could not do that. They get snowed in, and they work on chain ships where it is cold, and a man to do that work has to be a younger man. If a constructor is going to do all his work in an office, drafting, then of course he could get along at a much greater age—55 or 60.

Mr. ESCH. Just one question. What additional cost would be entailed if we were to do this—have you any estimate?

Captain HUTCHINS. Those districts have to be run all the same whether you divide them or not.

Mr. ESCH. Do you not have to have an additional inspector?

Captain HUTCHINS. Yes; an additional inspector and probably one engineer.

Mr. ESCH. For each district?

Mr. STEVENS. But they are on the pay roll somewhere now?

Captain HUTCHINS. Yes, sir; we do not have to get any new people.

Mr. ESCH. So that it does not increase the force?

Captain HUTCHINS. No, sir.

The CHAIRMAN. The next we will take up is House bill 8873, entitled—

A BILL to establish lights on the Monongahela River.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of the Treasury be, and he is hereby, authorized to establish sixty lights on the Monongahela River at such points as will aid the extended navigation of said river.

What do you say as to the necessity for that?

Colonel LOCKWOOD. That is a question affecting navigation that Captain Hutchins can answer.

The CHAIRMAN. Has the Board acted upon it?

Captain HUTCHINS. That was submitted to us the other day and it was very important, so we immediately telegraphed the inspector to take a look and report on it. He is on the spot, Lieutenant-Commander Seaborn, but the river is frozen up now, and he is not able to make his report, and he sent us an estimate of the amount required and it amounted to about $5,000.

The CHAIRMAN. Is there some new portion of the river opened up to navigation? This is an extended portion of the river?

Captain HUTCHINS. I do not know about that, but I would like to say that this thing was brought up some time ago, and it was discovered that every vessel coming up there had to pay toll, so the Light-House

Board—this was some time ago; I do not know how long—the Light-House Board decided that if vessels paid toll to parties, then the parties should light the river, and that is the way it was decided and turned out. Now, it is possible that there is no toll paid now, and if that is so this would seem to be proper.

Mr. RICHARDSON. The Government must take that burden?

Captain HUTCHINS. Yes, sir.

Mr. RICHARDSON. The Government must put up the lights?

Captain HUTCHINS. Yes; if they are not paying toll.

The CHAIRMAN. It is not possible for you to say about this now?

Captain HUTCHINS. No, sir; they only pay $15 for a man to look after those lights—half a dozen of them. That man will live on his farm, probably, or one or two of them. They do not cost very much.

The CHAIRMAN. We will take up next House bill 8702, entitled "A bill for establishing further aids for navigation in Delaware Bay and River." It provides "that $250,000, or so much thereof as may be needed, be, and is hereby, appropriated for the objects hereinafter named," which are twenty lights—lights and fog signals and light-houses.

Mr. WANGER. In reference to that bill, in accordance with the report of the Secretary of Commerce and Labor, which quotes the action of the Light-House Board, I intend to move, when that bill is reached for consideration, to strike out all after the enacting clause and authorize the Secretary of Commerce and Labor to establish nine additional aids to navigation, at a total cost of $635,000. The Secretary does not suggest that these aids shall be immediately established, but that they shall be established in order, and that from time to time the money shall be appropriated to carry out a general system, which will very much aid and expedite the navigation of the Delaware Bay.

The CHAIRMAN. Do you want that matter discussed now?

Mr. WANGER. Just as it is the pleasure of the committee.

Mr. STEVENS. Is that the statement that appears on page 17 of the report of the Board?

Mr. WANGER. I do not know the page that it is on, but it is in the report of the Board and it is in the Book of Estimates. It was estimated for by the Board.

Mr. RICHARDSON. The nine buoys your amendment suggests are some of them in this bill?

Mr. WANGER. The nine buoys do include some of those in this bill. Some of those are already appropriated for, and I think a few of those are not favored by the Board; that is my recollection.

The CHAIRMAN. Without objection, we will pass that. That includes the consideration of at least investigation of the bills that are now before us bearing on this subject.

Mr. WANGER. If you are that far along, I would ask that the secretary read the report in regard to this last.

Mr. Wanger here read the communication from the Secretary of the Department of Commerce and Labor referred to, as follows:

DEPARTMENT OF COMMERCE AND LABOR,
OFFICE OF THE SECRETARY,
Washington, January 11, 1904.

The CHAIRMAN COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE,
House of Representatives.

SIR: This Department has the honor to acknowledge the receipt of a letter from your committee, dated January 6, 1904, inclosing a copy of H. R. bill No. 8702, "for

establishing further aids to navigation in Delaware Bay and River," on which suggestions are asked touching the merits of the bill and the propriety of its passage.

In reply this Department begs leave to state that the Light-House Board, to whom the matter was referred, reports that it has carefully considered the matter of establishing further aids to navigation in Delaware River, and it has recommended that appropriations be made for the following-named works, on page 40 in its annual report for 1903:

Light-house and fog signal on Elbow of Cross Ledge	$75,000
Light-house and fog signal on Goose Island Flats	85,000
Range lights on Seventeen-Foot Knoll and Marcus Hook	70,000
Light-house and fog signal on Horseshoe Shoal	50,000
Light-house and fog signal on Joe Flogger Shoal	75,000
Light-house and fog signal on Miah Maul Shoal	75,000
Light-house and fog signal on Brown Shoal	80,000
Light-house and fog signal on Arnolds Point Shoal	85,000
Range lights on Oldmans Point	40,000
Total	635,000

The amounts are tentative and may be varied, as borings yet to be made shall show the actual need in each case.

Referring to other items in the bill, the Light-House Board states that Congress, by act approved March 3, 1903, item No. 10, appropriated $90,000 for the construction of Five Fathom Bank light-vessel; and so far as item No. 3, Horseshoe East, New Jersey, and west groups of range lights; item No. 11, Cape Henlopen day beacon, Delaware; item No. 12, Deep Water Point Range, New Jersey; item No. 14, Schooner Ledge Range, Pennsylvania, and item No. 15, Billingsport Range, Delaware Bay, New Jersey, are concerned, some of the improvements suggested are already being made, while the others, if deemed advisable by the Light-House Board, can be made from the general appropriations for the Light-House Service.

Congress has already made provision, by appropriation, for the light-house and fog signal in the seventeenth item, harbor of refuge, Delaware.

This Department does not recommend any legislation for the localities and works mentioned in items No. 18, light-house on northwestern end of the harbor of refuge, Delaware; No. 19, light-house on Delaware Breakwater, west end, Delaware, and No. 20, light-house and fog signal on Delaware Breakwater, east end, Delaware, as the Light-House Board reports that, in its opinion, suitable provision has already been made or authorized for these localities.

This Department does not suggest that any change be made in the amount appropriated in the first paragraph of this bill, namely, $250,000, as it is satisfied that the structures recommended can not be erected for that sum, but begs leave to suggest that the construction of the lights, etc., named in this letter be authorized, at a cost of not exceeding $635,000, and that $250,000 be appropriated for commencing the works in the order named.

Respectfully,

GEO. B. CORTELYOU,
Secretary.

I accordingly drew this as a substitute:
Strike out all after the enacting clause and insert:

That the Secretary of Commerce and Labor be, and he is hereby, authorized to establish the following additional aids to navigation in Delaware Bay and River:

First. A light-house and fog signal on Brown Shoal, at a cost not to exceed eighty thousand dollars.

Second. A light-house and fog signal on Miah Maul Shoal, at a cost not to exceed seventy-five thousand dollars.

Third. A light-house and fog signal on Elbow of Cross Ledge, at a cost not to exceed seventy-five thousand dollars.

Fourth. A light-house and fog signal on Joe Flogger Shoal, at a cost not to exceed seventy-five thousand dollars.

Fifth. A light-house and fog signal on Arnolds Point Shoal, at a cost not to exceed eighty-five thousand dollars.

Sixth. A light-house and fog signal on Goose Island Flats, at a cost not to exceed eighty-five thousand dollars.

Seventh. Range lights on Old Mans Point, at a cost not to exceed forty thousand dollars.

Eighth. Range lights on Seventeen-Foot Knoll and Marcus Hook, at a cost not to exceed seventy thousand dollars.

Ninth. A light-house and fog signal on Horseshoe Shoal, at a cost not to exceed fifty thousand dollars.

The CHAIRMAN. Captain, do you regard these, with the propositions here, as of primary importance?

Captain HUTCHINS. Yes, sir. We have had this up several times before the Board, not exactly that scheme, but others, and the Board is of the opinion that they ought to be built.

The CHAIRMAN. Well, do you regard it as important at this time, when you say that it ought to be built?

Captain HUTCHINS. We regard it as important at this time to commence the work.

The CHAIRMAN. Now, what is the comparative importance of this first proposition here, light-houses and fog signal on Brown Shoal at a cost not to exceed $80,000, as compared with this light-house or light-ship at Brunswick, for example?

Captain HUTCHINS. I am not able to say.

The CHAIRMAN. Is it not true that you mean by this recommendation simply to suggest that when the aids to navigation are all in, and when this work, this Delaware Bay, considering it as a work, is completed, that all of these ought to be included?

Captain HUTCHINS. Yes; they all ought to be included.

The CHAIRMAN. You do not regard it as important like it would be if it were some great beacon out on the ocean?

Captain HUTCHINS. I could not say, Mr. Chairman.

The CHAIRMAN. What would you say as to the comparative importance of any one of these lights in these nine propositions compared with a permanent light on outer Diamond Shoals? Which would be the most important one, in your opinion?

Captain HUTCHINS. I would say the outer Diamond Shoal light.

The CHAIRMAN. It would be very much more important, would it not?

Captain HUTCHINS. Yes, sir.

The CHAIRMAN. Infinitely greater in importance?

Captain HUTCHINS. Yes, sir; it would be very important.

The CHAIRMAN. Then these things that are included here are really very largely of secondary consideration?

Captain HUTCHINS. It is the commerce of Pennsylvania, of the Delaware River and Philadelphia and all up there, that is to be considered.

The CHAIRMAN. Is it not simply a matter of convenience rather than a matter of necessity.

Captain HUTCHINS. I think it is a matter of necessity, and in order to keep from having accidents. Their vessels run ashore and we have considerable difficulty with our buoys. The more light-houses we have the fewer floating aids are necessary, and the floating aids now in the Delaware River go adrift.

The CHAIRMAN. Is not that a small expenditure in comparison with $635,000?

Captain HUTCHINS. Colonel Lockwood can tell you how much of that they can expend in a year, because the Board has not decided what the foundations will be.

The CHAIRMAN. You do not even know what the foundations will be at any one of them, do you?

Captain HUTCHINS. Colonel Lockwood can tell you about that.

Colonel LOCKWOOD. The basis of the report is the experience that I have had in establishing lights in that locality. The 14-foot bank light which is mentioned here, and these light-houses and other aids mentioned in this substitute recommended by the Board, are deemed of great importance in connection with the commerce of Philadelphia.

The CHAIRMAN. Yes.

Colonel LOCKWOOD. They are very essential, and these structures all have to be caisson structures. All the light-houses that are in the water have caisson structures on account of the ice. That makes them expensive.

The CHAIRMAN. Now, tell me how many wrecks have occurred in that river at any one of these nine points in the last twelve months.

Colonel LOCKWOOD. I could not tell you.

The CHAIRMAN. Has there been one?

Colonel LOCKWOOD. I could not tell you a thing about it.

The CHAIRMAN. Have you heard of one?

Colonel LOCKWOOD. I am entirely ignorant on that subject.

The CHAIRMAN. Then you know of no instance in which commerce has suffered during the last twelve months by not having these lights?

Colonel LOCKWOOD. It has suffered principally from delays.

The CHAIRMAN. I say you know of no instance in which commerce has suffered by reason of not having these lights during the last twelve months?

Colonel LOCKWOOD. No, sir; I can not recall an acute case.

The CHAIRMAN. Then any case you have in your mind's eye is a case of delay?

Colonel LOCKWOOD. These are for the purpose of facilitating navigation and commerce, and that is all I can say.

The CHAIRMAN. Yes.

Colonel LOCKWOOD. And they are deemed of sufficient importance for the Board to recommend their establishment. That is all I can say.

Mr. WANGER. May I read the note in the Book of Estimates?

(Mr. Wanger here read the item from the Book of Estimates referred to.)

The CHAIRMAN. What class of vessels are especially interested in the establishment of these nine lights, sailing vessels or steamers?

Colonel LOCKWOOD. The heavy-draft steamers.

The CHAIRMAN. That grows out of the fact of trying to send a steamer drawing 30 feet over a bar where there is only about 25 feet of water, does it not?

Colonel LOCKWOOD. The object of establishing these lights is to enable vessels to take advantage of the deeper water that the Government has been establishing in the Delaware River.

The CHAIRMAN. Suppose that the plan that is now being discussed of deepening that waterway from Philadelphia to the ocean to 35 feet is carried out, would these aids be so essential?

Colonel LOCKWOOD. Yes, sir; I should say so.

The CHAIRMAN. They still would be?

Colonel LOCKWOOD. Yes, sir.

The CHAIRMAN. Then would that fact increase their importance?

Colonel LOCKWOOD. The fact that deeper draft vessels would come in?

The CHAIRMAN. Yes.

Colonel LOCKWOOD. Yes, sir; I would say it would.

The CHAIRMAN. Is it coming to be understood as a truth in your department that the deeper the waterways are made the greater the necessity of expenditure in these additional aids?

Colonel LOCKWOOD. Oh, yes; these deeper draft vessels are more liable to get aground than those that do not draw so much. They are heavier and harder to handle. That is a navigation feature, though, that I am not qualified to pass upon. Naturally those vessels are heavier to handle, and harder to handle, and they need more aids than the lighter draft vessels, even if the channel is correspondingly increased in depth. I think I am right about that.

Captain HUTCHINS. Yes.

Mr. WANGER. The deepening of the channel usually gives an increase of commerce?

Colonel LOCKWOOD. Yes; an increased draft of ships.

Mr. STEVENS. Do these large steamers navigate the Delaware at night now on dark nights?

Colonel LOCKWOOD. I do not think so, as a general thing.

Mr. STEVENS. Could they now if they had those aids to navigation?

Colonel LOCKWOOD. They could do it more readily.

Mr. STEVENS. It would not insure navigation on a dark night?

Colonel LOCKWOOD. I do not know about that, Mr. Stevens; but it would enable very heavy draft vessels to go up at all times, even if the heaviest had to stop down at the Capes.

Mr. STEVENS. They do not do it now?

Colonel LOCKWOOD. I do not think they do. I do not think the heaviest ones go up and down at night. Is not that right?

Captain HUTCHINS. Yes, that is right.

The CHAIRMAN. I would like to call your attention to this paper again in connection with the Diamond Shoals light-house. I wish you would put that in just such shape as the specification shows, to apply to the superstructure of this light as your Board thinks it should be for the accommodation of the crew or the parties that you will have there and their stores, and the light and the fog signal, and everything of that kind, not interfering, however, in any way with the permanency of the structure. That, I think, the committee wants to be remanded entirely to the builder; but we want your ideas as to the matters of convenience and comfort and sufficiency of the light and sufficiency of the fog signal.

Colonel LOCKWOOD. Do you mean any more fully than I have it there?

The CHAIRMAN. Just as fully as you want it, and then we want you to identify it; call it "specifications," if you choose, for the superstructure of this light-house furnished at the instance of this committee and to be held by you as a record—held by your Board, so that we can refer to that paper by title.

Colonel LOCKWOOD. I think the Board will be satisfied with that.

The CHAIRMAN. I want you to indentify it in some way as a record.

Colonel LOCKWOOD. I have signed my name to it.

The CHAIRMAN. What is that?

Colonel LOCKWOOD. That letter.

The CHAIRMAN. Yes; but how could we refer to it in this act? Give it some kind of a caption.

Colonel LOCKWOOD. I am very anxious to do what you want me to do.

The CHAIRMAN. Call it "Letter of January 27 to the chairman of the committee."

Colonel LOCKWOOD. No, that is not the one. You have the wrong one. Here is the one that I brought this morning.

Mr. ADAMSON. I suggest that you let Colonel Lockwood perfect that.

Colonel LOCKWOOD. I will send you the original.

The CHAIRMAN. No; I want you to keep it.

Colonel LOCKWOOD. The one that I sent you this morning was fastened together. Here it is, directed to the chairman [producing another letter]. The one you have been looking at is the one I left with you the other day.

The CHAIRMAN. Now, the new one is all right, is it?

Colonel LOCKWOOD. Yes, sir; that is a copy of the report of the Board in 1900, and is a copy of what was——

Mr. ADAMSON. It really does contain the specifications as to the light-house on Diamond Shoals, or what is it?

Mr. ESCH. Superstructure?

Mr. ADAMSON. Yes.

The CHAIRMAN (reading):

FEBRUARY 3, 1904.

The CHAIRMAN OF THE COMMITTEE ON
INTERSTATE AND FOREIGN COMMERCE,
House of Representatives, Washington, D. C.

SIR: In compliance with the oral request made to the secretary of the Light-House Board, at the session of your committee February 2, 1904, I have the honor to submit herewith general specifications, prepared by the committee on engineering of the Light-House Board, consisting of General Casey, Chief of the Corps of Engineers, U. S. Army, Colonel Craighill, afterwards Chief of the Corps of Engineers, U. S. Army, Commander Coffin, U. S. Navy, and Major Gregory, Corps of Engineers, U. S. Army, which in the Board's opinion a light-house on Diamond Shoal, Cape Hatteras, North Carolina, should comply with, in order to insure its efficiency as a first-class modern structure in keeping with its importance and location.

These general specifications were prepared in 1890 with reference to the structure proposed to be built by Anderson & Barr and hold good to-day, except that the largest boat specified below should be a strong, petroleum-power launch, and owing to improvements in fog-signal apparatus storage for 20 tons of coal is now deemed sufficient.

The following is an extract from the report of the engineering committee and refers to tower itself or the part of the stone tower above the foundation:

"The first floor of the structure is to be at least 30 feet above high-water mark. It is to be accessible from the water by a strong iron ladder, and must be large enough for the storage of 30 tons of coal, 6 cords of wood, 8,000 gallons of fresh water, and 3 lifeboats, of 25 feet, 20 feet, and 18 feet in length, respectively. It is to be provided with a hoisting arrangement suitable for handling the boats or a load of 2 tons to be taken from the deck of a vessel anchored at a distance of 20 feet from the structure. The hoisting arrangement is to be so constructed that the parts used on the outside of the tower may be readily withdrawn into the interior of the structure, and so that it may be operated either by hand or steam power, the boiler for the latter to be located on the second floor.

"To gain the largest possible floor space in the first story for operating the machinery and for the handling of the material to be hoisted, the fuel and water may be stored in a centrally located vault provided in the mass of the foundation, and the boats may be hung under the ceiling.

"On the second floor the fog-signal apparatus, the boiler, and feed-water heater for the hoisting engine is to be located. There must be ample space for operating the machinery, and there must be provided a bin large enough to contain one ton of coal, a workbench, and closets for the storage of all necessary tools. A steam pump for feeding the boiler and for filling the salt-water tank on the third floor is to be located in a shaft to be provided for this purpose in the mass of the foundation.

"The third floor is to have a fireproof vault for the storage of 460 cases of mineral oil, each case measuring 12½ by 12½ by 14½ inches high. The vault is to have double iron doors, the outer to be air-tight; automatic ventilators, which close in case the oil should take fire, and a drain from its basin-shaped floor leading into the sewer pipe, through which the oil can run off in case of accident. The third floor must also be provided with salt-water tanks, having a total capacity of 1,600 gallons, and the remaining space is to be utilized for the storage of one year's provisions for four men, for which all necessary shelving and closets are to be provided.

"The fourth and fifth floors are to be used for bedrooms. Each floor is to have two separate rooms, each large enough to contain the necessary furniture (bed, bureau, table, and two chairs), and one closet.

"The sixth floor is to be utilized for a kitchen, containing a pantry and closets for storing all necessary cooking utensils and table furniture.

"On the seventh floor is to be the sitting room; it is to have fresh-water tanks of a total capacity of 1,600 gallons and two closets.

"The eighth floor, which is to be immediately below the main gallery of the tower, is to be used for the service room; it is to be fitted up like the sitting room, and must contain two closets.

"The main gallery of the structure must have an area of at least 360 square feet; it supports the watch room and the lantern, which are to be similar in construction to those adopted by the Board.

"The choice of the various kinds of materials to be used in the construction of the tower is to be left to the designer and contractor. The building, the different floors, and the stairways must be entirely fireproof, and the flights of the latter are to be so arranged that fire originating on any floor can not be communicated by them to the others. The first, second, and third floors are to be covered with fireproof material and, excepting the first floor, are to have trapdoor openings to permit the stores to be hoisted upon the third floor. The remaining floors, except the iron watch-room floor, are to be covered with wood.

"All door frames of the structure exposed to the weather are to be made of iron; the doors are all to be double, the outer ones to be made of iron.

"The rooms are all to be well lighted; the iron window frames are to have double sashes, without exception.

"The rain water falling upon the main gallery of the tower is to be conducted into the fresh-water tanks on the seventh floor. The overflow of these tanks is to be conducted into the large fresh-water tanks or cisterns on or below the first floor, which overflow into the sea. The water to be used in the kitchen is to be piped from the floor above to the sink.

"The sewer pipe, which has its upper end at the sink in the kitchen, passes through the structure and its foundation and leads into the sea. It is to have trapped cesspool branches from the first, second, and third floors and from the oil vault, and must be properly ventilated.

"The pipe supplying the first, second, and third floors with salt water from the tank in the third story terminates in the water-closet on the first floor, from which a separate sewer pipe is to lead into the sea.

"All pipe branches, except those embedded in the mass of the foundation, are to be so arranged that they can be replaced and renewed without destroying any portion of the building.

"The brick chimney of the structure must be large enough in cross section to carry off the smoke from all furnaces on the second floor, from the kitchen stove, and the heating stoves in the sitting and service rooms. It is to be continued above the main gallery by a copper pipe, which terminates above the highest part of the lantern. The copper pipe is to be located on the west side of the lantern, and is to be surrounded up to the level of the lantern gallery by a cast-iron pipe, the air space between the two forming a nonconductor of heat.

"Fresh and foul air ducts are to be provided throughout the whole building, to enable the keeper to ventilate each and every room of the structure without opening the doors or windows.

"The contract for the structure will also include the furnishing and putting in place of every article required to fully and completely equip the light tower for service, viz: Carpets, furniture, bedding, linen, cooking utensils, table furniture, stoves, electric call bells, a full set of carpenters' and machinists' tools, the three boats complete, with oars, sails, and all necessary fittings, life-preservers, a set of flags, the ropes for the hoisting arrangement, tackles, etc.

"The contractor must obtain from the United States Government, at the light-house depot at Staten Island, New York, the fog-signal machinery, the lenticular apparatus, including lamps, oil, and all necessary articles required for the exhibition of the light;

such articles to be furnished him at cost. The contractor will be required to transport them to the site and have them erected there under the supervision of an agent of the Light-House Board.

"An inspector employed by the Light-House Board will inspect all material and workmanship, and any part of either which is not in accordance with the specifications must be promptly and satisfactorily replaced by the contractor.

"The contractor will have to furnish the inspector with satisfactory board and lodging, and must transport him to and from the site whenever the agent deems such transportation necessary; board, lodging, and transportation to be without extra charge either to the inspector or to the United States Government.

"After the light tower has been entirely completed the contractor will be required to maintain the light station in strict accordance with the regulations of the Light-House Service for a period of one year."

Then follows what we have here.

Colonel LOCKWOOD. Does that say "stone tower?"

The CHAIRMAN. Stone towers above the foundation.

Colonel LOCKWOOD. That is a mistake.

The CHAIRMAN. "Tower," I suppose it should be, without any specification?

Colonel LOCKWOOD. Yes; that is a mistake. That should be crossed out.

The CHAIRMAN. I will cross it out here [marking on paper]. Then at the close:

A full set of drawings and a complete set of specifications were required to be furnished by the contractor.

The choice of the various kinds of materials to be used in the construction of the tower was left to its designer and contractor; the contractor proposed to construct the shell of the tower of cast-iron plates, and to line the inside of the tower with brickwork kept separate from the iron structure and to carry the weight of the floors. The Board approved this feature of the construction.

As the modern fog signals would be operated by oil engines, storage for 800 cases of oil instead of 460 would now be required.

Respectfully,

D. W. LOCKWOOD,
Lieut. Col., Corps of Engineers, U. S. Army,
Engineer Secretary.

Now, as I understand it, this still has a provision for that brick lining?

Colonel LOCKWOOD. Yes, sir.

The CHAIRMAN. I think that pertained to the question of the structural sufficiency of the work. That we do not want to interfere with.

Colonel LOCKWOOD. There is no recommendation made there as is indicated in the letter, about the height.

Mr. RICHARDSON. Those two specifications were recommended by Anderson & Co., in 1890.

Colonel LOCKWOOD. The same thing.

Mr. RICHARDSON. Which were a total failure?

Mr. WANGER. I notice your referring there to the cast-iron plates supported by brickwork.

Colonel LOCKWOOD. No, sir; not supported by brickwork. They are entirely separate.

Mr. CUSHMAN. Lined?

Colonel LOCKWOOD. Yes, sir; lined with brickwork.

Mr. WANGER. That was simply because it was the plan of the contractors?

Colonel LOCKWOOD. In a measure, and also to insure ventilation and sanitation.

Mr. WANGER. What I wanted to get at was, whether the fact that

these were to be cast iron rather than wrought iron or cast steel was a material fact, or whether that one particular article was referred to because it was proposed by the contractor to use it and the Board was satisfied with it.

Colonel LOCKWOOD. The brickwork was not to strengthen the shell of the tower at all.

Mr. ADAMSON. It was to support a floor?

Colonel LOCKWOOD. Yes; to support a floor.

Mr. ADAMSON. Can not other devices do that just as well?

Colonel LOCKWOOD. It could be supported by pillars from floor to floor, from the foundation.

Mr. CUSHMAN. Is it not possible to construct there a steel tower, making the steel sheathing of sufficient strength to support the floors—is not that possible as an engineering feat?

Colonel LOCKWOOD. There is no doubt about that, but the distortion of the floors from time to time by the swaying of the tower with the winds, and so forth, would be very great.

Mr. ESCH. Would it affect the weight?

Colonel LOCKWOOD. Possibly not. It would affect the details of the construction; but the floors have to be fireproof, because there is a large quantity of coal and oil, and a fire in a structure of that kind would be a very serious matter.

Mr. RICHARDSON. This is the same thing that you made in 1888 when Anderson made the contract, and did he not complain of this structure then, the same thing you have here, as being unwieldy and cumbersome?

Colonel LOCKWOOD. I do not know.

Mr. RICHARDSON. What is the fact about that?

Colonel LOCKWOOD. I do not remember.

Mr. ADAMSON. Can not a horizontal support for the floors be so arranged that they will give and slide where they join the steel walls, to guard against the contraction and expansion of the steel structure?

Colonel LOCKWOOD. No, sir; not very well.

Mr. WANGER. Could not that shell be made stronger of rolled steel than of cast iron?

Colonel LOCKWOOD. Yes, sir; but the only reason in this case that Anderson & Barr proposed cast iron was that it was cheaper and they could make it as heavy as they chose.

Mr. WANGER. That is what I was trying to get at.

Colonel LOCKWOOD. Weight was regarded as an important feature in determining the stability of the structure.

Mr. WANGER. I asked that question.

Mr. BURKE. Did you not say something about this structure having to be lined with brick on account of sanitary reasons?

Colonel LOCKWOOD. Yes; I stated that to-day.

Mr. BURKE. Why is that true any more than it would be on a ship? A ship goes to sea for a whole year.

Colonel LOCKWOOD. Well, but there are means of ventilating and taking care of a ship, which makes it a very different matter. They have that entirely under their control there. They can ventilate a ship in wet weather by blowers.

Mr. ADAMSON. Does not brick absorb water and tend to disintegration when out in the water that way?

Colonel LOCKWOOD. It might, but it is used in this way. We lined the houses out in Chesapeake Bay, for instance: we built brick houses on top of the caissons, and we did it just on that account, and we only use an iron structure for quarters where we are compelled to by reasons of space.

Mr. STEVENS. Do you regard a double structure, one that is double, as one that is absolutely necessary for permanancy and utility after you get control of it?

Colonel LOCKWOOD. I do not know that it would be. You see, it is impossible to answer questions of that kind without knowing something about what it is going to be. There are no plans. You can not tell.

Mr. STEVENS. But considering that you have these plans, do you regard it as necessary to have a double structure—an inside one for sanitation, and an outside one for protection?

Colonel LOCKWOOD. I should say yes.

Mr. STEVENS. Would not a single structure accomplish all that?

Colonel LOCKWOOD. If the single structure was of metal I should say that it was highly desirable to have it lined inside with something to insure proper construction.

Mr. STEVENS. Could not terra cotta accomplish that purpose?

Colonel LOCKWOOD. I could not go into that. I do not know anything about the terra cotta construction.

Mr. STEVENS. What I wanted to get at was whether a brick structure was absolutely necessary.

Colonel LOCKWOOD. Not absolutely necessary but highly desirable—to put it in that way—for sanitation and to carry the floors. That is a very strong feature of it.

Mr. CUSHMAN. Before the gentlemen leave—do I understand that it is your intention, in reviewing the light-house bills, to take up each and all of them or only the most important ones?

The CHAIRMAN. All of them; I thought that I had taken them all up.

Mr. CUSHMAN. In reference to the State of Washington, I do not recollect that those bills were taken up.

Mr. ADAMSON. In building these immense steel structures—these skyscrapers—do they not have an adjustable system of girders that all slide and give to one another?

Colonel LOCKWOOD. That is an art by itself, and I could not answer as to that.

Mr. ADAMSON. That would apply to the question I asked you about the construction of the floors. They have a play of a few inches before striking the fastener at the end. Do you not think that might meet that question?

Colonel LOCKWOOD. Perhaps so, but in these tall structures weight does not count for so much as it does here.

Mr. ADAMSON. Your whole problem is to guard against expansion and contraction of the walls?

Mr. CUSHMAN. I do not know that we would gain anything by going over those bills I speak of. There are about four small bills that have recommended in the annual reports of the Light-House Board.

The CHAIRMAN. Then we will not take those up. You have favorable reports, I believe.

Mr. CUSHMAN. Yes.

STATEMENT OF HON. JOHN H. SMALL, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NORTH CAROLINA.

Mr. SMALL. Mr. Chairman and gentlemen, I will be brief. In the first place, I wish to comment upon what I understand to have been one or two objections to this project of Captain Eells. Some question has been made as to the competency and character of Captain Eells to undertake this construction or to enter into the contract with the Government. I desire to present a few testimonials bearing on his personal worth and character, and also as to his competency, which I think will be conclusive with the committee.

The CHAIRMAN. I do not think that is the question at all, Mr. Small.

Mr. SMALL. I think, sir, while it might strike the chairman that way, yet, judging from my conversation with some of the members, they might like to know something as to the worth and skill of Captain Eells.

The CHAIRMAN. Go on; very well.

Mr. SMALL. I will be guided by you, however, in that matter.

The CHAIRMAN. Go on. I did not know of that.

Mr. SMALL. There is a testimonial signed by L. L. Buck, civil engineer and consulting engineer, in New York City, dated March 3, 1900, addressed to Captain Eells.

Mr. ADAMSON. I suggest, if any member is skeptical in that matter, that that paper should be filed.

Mr. RICHARDSON. Let him read it, and let it go in the record.

Mr. ADAMSON. He might just file it.

The CHAIRMAN. Go on, Mr. Small, and follow your own inclination about it.

Mr. SMALL. I will file as a part of my remarks the following testimonials:

NEW YORK, *March 3, 1900.*

DEAR SIR: I have examined with care your plans for foundations of light-houses or jetties and think favorably of them. With the suggestions I have made with a view to greater future security, I approve the designs and should be willing to trust them to accomplish the desired object. I think that a light-house built in accordance with these designs in 30 feet of water exposed to the action of the ocean would be permanent and safe.

Very respectfully, L. L. BUCK.

Capt. A. F. EELLS,
44 Pearl Street, Manhattan, N. Y.

THE HYDRAULIC CONSTRUCTION COMPANY (INCORPORATED),
New York, February 26, 1900.

DEAR SIR: I have examined your plans and designs for submarine construction for light-houses, etc., and same seem to me to be meritorious and in advance of the present state of the art, especially in providing what seems to be a thoroughly safe and substantial caisson which should be able to withstand any ordinary weather and be safely landed and located in difficult or treacherous places.

The design likewise offers a good working platform, is well arranged for buoyancy, and presents a number of features which seem to render it both practicable and desirable.

I am inclined to believe it may solve the problem of the location of light-houses on some points which, in the present state of the art, are impracticable, and such a structure, when properly designed, constructed, and located, should be permanent and withstand both sea and weather.

Yours, very truly, WM. D. H. WASHINGTON,
President.

Capt. A. F. EELLS,
44 Pearl Street, New York City.

THE BOARD OF ENGINEERS,
New York, March 5, 1900

Mr. FRANCIS W. HOUGHTON,
Superintendent Maritime Exchange, New York City.

DEAR SIR: In reply to yours of the 3d instant, I would state that Mr. L. Buck is the engineer of the East River Bridge, now in course of construction, and Mr. Theo. Cooper is consulting engineer, and I understand that bridges are his specialty.

Both of these gentlemen are of the highest reputation, and of course bridges include the pier foundation, so I think that their opinion on a question of submarine foundations would be very valuable. Mr. Wm. D. H. Washington, I understand, is president of an hydraulic contracting company, but I have no knowledge of his reputation as an engineer.

I suppose that one could find out from the editors of Engineering News, St. Paul Building, as to Mr. Washington's standing as an engineer in submarine foundations.

Very truly, yours,

HENRY M. ROBERT,
Colonel, Corps of Engineers.

FEBRUARY 26, 1900.

Capt. A. F. EELLS, *44 Pearl street, New York.*

DEAR SIR: The construction of a subbase for a light-house off Pollock Rip Shoals by means of a floating caisson, to wed to and grounded on any desired point, and then filled with concrete and masonry and built up to any required elevation, is a perfectly feasible project.

There would be no untried problems in constructing such a foundation. Bridge piers and sea works all over the world have thoroughly proved the success of such methods, and there would be no more reason to question the permanency of this work, if properly proportioned and constructed, than would apply to all of these.

Yours, truly,

THEO. COOPER.

NEW EAST RIVER BRIDGE COMMISSION,
New York, April 10, 1899.

Lieut. WM. H. KING,
67 Madison avenue, New York.

DEAR SIR: I have read with great interest the patent specifications and the general description of the Eells light-house construction. The plans of Captain Eells seem to be feasible in every particular and offer a solution of the problem of light-house building at places which, in my opinion, no other method would be possible.

There are no engineering or constructive difficulties in the way of building, sinking, fixing, or securing such a structure.

Yours, truly,

LEWIS NIXON.

[Extracts from a letter written by Commander George F. F. Wylde, U. S. Navy, to Capt. Albert F. Eells, dated March 10, 1896, at which time Commander Wylde was naval secretary of the Light-House Board.]

There is no *doubt* whatever in my mind of the *eminent* practicability of your scheme. To my mind it is not only by far the *best*, but the only practicable solution *ever offered*. The more I look into it the more I believe in it.

[Extract from a letter from Mr. R. R. Fuller, of Boston, Mass., president of the Boston Marine Insurance Company and president of the Eastern Steamship Company, dated December 6, 1900. The Eastern Steamship Company represents all the coastwise steamships running east from Boston.]

The letter is addressed to whom it may concern and is as follows: "Having known the bearer, Capt. Albert F. Eells, of Maine, for many years, I take pleasure in stating that I consider him well informed in matters pertaining to shipping and capable of accomplishing what he undertakes. I also consider him entirely trustworthy and reliable and recommend him to the shipping interest as being thoroughly familiar with their needs."

Mr. WANGER. Did the captain erect the caisson at Pollock Rip?

Mr. SMALL. It was first proposed that he should construct a light-house at Pollock Rip, but on the conclusion of the Light-House Board

that the channel there was so shifting as to not justify a permanent structure, that was abandoned.

Mr. BURKE. He refers there to plans and specifications, does he not?

Mr. SMALL. Yes; plans and specifications have been made. It was suggested that Captain Eells was not a distinguished engineer, and it was asked if he had the commendation of any engineers of repute who had examined the plans and specifications for submarine foundations at dangerous places on the coast, and I am only reading these testimonials to answer that objection.

The CHAIRMAN. There was no question about the basis of this. We did not care about that, because we took all the risk. The question was about the superstructure to be built on this foundation. That was the suggestion of the Board.

Mr. SMALL. Yes, sir. With your consent and the consent of the committee I will file copies of these other testimonials, and hand them to the stenographer and let him include them in this report of this meeting.

The CHAIRMAN. Very well.

Mr. SMALL. There was another suggestion, that if Captain Eells and his associates should be authorized to construct this light-house he or his heirs would be coming to Congress for many years demanding compensation. Of course, there is that element of danger; but, in so far as the committee may deem necessary or advisable, this bill may contain any provision to the effect that failure upon his part shall not give him, or his successors or assigns or heirs, any claims against the Government whatever.

Mr. ADAMSON. He is willing to uncomplainingly accept the judgment of the Government on the subject?

Mr. SMALL. Yes, sir.

Mr. ADAMSON. Without appealing to anyone?

Mr. SMALL. Yes; without appealing toanyone. And then, in order that this matter may be unquestioned, I will say that I have read carefully the specifications filed by Colonel Lockwood at the last meeting, and which I understand are substantially embraced in this same communication read before the committee to-day, and substantially, Captain Eells, in order to get an opportunity for the construction of this light station, is willing in the main to yield on all those points formulated by the Light-House Board. I might go on and suggest one or two exceptions which would properly, however, come before the committee or a subcommittee to formulate this bill, and I will take the time simply for one or two while Colonel Lockwood is here.

First. As to the lifeboats, Captain Eells thinks that two are sufficient, one of which will be a substantial petroleum lifeboat; but he says as to furnishing sufficient room to store those boats in the light-house, that, in his judgment, is entirely unnecessary, and the taking up of unnecessary room in the construction. For instance, he says that ships carry boats—boats of the same strength and capacity as these—and yet they carry them exposed.

Mr. ADAMSON. These are matters of detail that perhaps you would like to speak about to the subcommittee, and I was going to suggest that the chairman and Colonel Richardson constituted a subcommittee, and that they might be continued and you could refer it to them.

Mr. SMALL. That is a good idea. Captain Eells says that there should be room for everything necessary, and in a structure of this kind room should not be taken up with unnecessary things, and that

these boats could be kept outside covered with tarpaulin, so that they would be kept properly and securely.

Mr. RICHARDSON. That is done on all sea craft?

Mr. SMALL. Yes; and on all boats.

Mr. KYLE. I understand that Captain Eells said that he was willing to undertake the construction on such plans as the Light-House Board would determine upon for the superstructure.

Mr. SMALL. Yes.

Mr. KYLE. As I take it, the committee does not know about these things and they have asked the Light-House Board to furnish them such instructions or specifications for the construction of that superstructure as the requirements demand, and that has been done, and now the first thing is an objection from Captain Eells to them because they contain certain things which he does not think ought to be put there.

Mr. ADAMSON. I should move, Mr. Chairman, that you and Judge Richardson take charge of this matter as a subcommittee, the same subcommittee, you and Judge Richardson, with the addition of Judge Kyle.

Mr. KYLE. I think it ought to be left with the two.

The CHAIRMAN. It is moved that the matter be referred to a subcommittee composed of the Chairman, Mr. Kyle, and Mr. Richardson.

(The motion was seconded and carried.)

Mr. SMALL. I have just one more word, and then I will not detain the committee any longer. Unless this shall become a law within a few days, then it would mean the postponement of this work for a year. It must be done within the year.

Thereupon the committee proceeded to the consideration of executive business, at the conclusion of which it adjourned.

AMERICAN ASSOCIATION OF MASTERS AND PILOTS OF STEAM VESSELS, CAMDEN, N. J.

Whereas Cape Hatteras and Diamond Shoal, on the coast of North Carolina, constitutes the most dangerous menace to navigation on the entire Atlantic seaboard, and the Outer Diamond Shoal, about 9 miles from land, is not marked by any aid to navigation except a light-ship about 6 miles therefrom and which goes adrift from her moorings frequently in severe storms; and

Whereas the construction of a permanent and substantial light-house on or near the Outer Diamond Shoal is of the greatest importance to navigation and the commerce of the whole country; and

Whereas the United States Government has heretofore been unable or has failed to construct a light-house on this shoal, although at least one attempt was made to do so about ten years ago; and

Whereas Capt. A. F. Eells proposes to undertake the construction of a light-house on Outer Diamond Shoal in 30 feet of water, at his own expense, and is willing to wait several years in order to determine the permanence of said constructure before demanding compensation thereof, providing Congress will authorize him to do so: Now therefore,

Resolved, That we most earnestly approve of this project for the construction of a light-house by the said Capt. A. F. Eells, and we urge upon the Congress to enact the necessary legislation for this purpose.

Resolved, That a copy of this resolution be forwarded to each Senator and Representative in Congress.

Signed by the grand captain and the grand captain's clerk, with the seal of the Grand Harbor attached thereto.

[SEAL.] JOHN O. SILVA, *Grand Captain.*

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